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Annotated Checklist of the Amphibians and Reptiles of Nebraska

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ANNOTATED CHECKLIST OF THE AMPHIBIANS AND REPTILES OF NEBRASKA

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Thirteen species of amphibians and 47 species of reptiles presently are known from Nebraska, including one species of lizard here reported for the first time. Although Nebraska has no obvious geographic barriers within its borders, most species (50) have range limits within the state. Fourteen species have essentially statewide distributions and 12 others occur widely over eastern Nebraska. With the exceptions of the two species of leopard frogs (one found over the northern half of Nebraska and the other over the southern half) and eight species of reptiles whose distributions are strongly influenced by the Sand Hills, the remaining species of the herpetofauna have distributions that only encroach on Nebraska's borders. Three species of western reptiles are found in the Nebraska Panhandle. Three species of southern Plains snakes occur in the southwestern corner of the state. One amphibian and three reptilian species, widespread in Kansas, occur along the southern fringe of Nebraska. The eastern influence is even greater in that 14 species occur only along the eastern border or have restricted distributions in southeastern Nebraska. The most poorly collected parts of the state are in eastern Nebraska, especially the northeastern quarter of the state. Limited evidence suggests that several species of reptiles have become much rarer or have experienced restrictions of distributions over the past 20 to 30 years.

† † †

More than 40 yr ago, George Hudson (1942) published a brief account of the amphibians and reptiles known from Nebraska. Hudson's work remains available, in reprinted form, through the Conservation and Survey Division of the University of Nebraska, but it is badly out-of-date. For the past decade materials necessary to prepare a new account of the amphibians and reptiles of Nebraska have been gathered, but that study will not be published for at least 2 yr and because there is a need for an up-to-date synopsis of the Nebraska herpetofauna this preliminary report was prepared. An additional benefit in publishing these notes is to prompt persons having significant records to make me aware of them. Although few additional species are likely to be added to the state's herpetofauna (with the exception of one or two snakes in southeastern Nebraska), there exist vast areas of the state from which no preserved specimen is known for several species. There are likely to be significant alterations in our knowledge of the distributions of many of the reptilian species, especially of less common snakes. Hopefully, biology teachers will notice the absence of records for their areas and provide specimens for deposition in the University of Nebraska State Museum.

Within the political limits of Nebraska, there are two species of salamanders, 11 species of frogs or toads, eight species of turtles, 10 species of lizards, and 29 species of snakes. Although many of these animals are typical inhabitants of the Great Plains, none is restricted in its distribution to Nebraska. Only 10 species occur throughout the state (tiger salamander, Rocky Mountain toad, striped treefrog, snapping turtle, painted turtle, blue/green racer, milk snake, bull snake, Plains gartersnake, and common gartersnake), although several others are virtually statewide in distribution. In the accounts below, species are arranged in alphabetical order (using scientific names) within popular ordinal groups (Caudata—salamanders, Anura—frogs and toads, Chelonia—turtles, Lacertilia—lizards, and Serpentes—snakes).

SALAMANDERS (Order Caudata)

Salamanders are amphibians, but they are occasionally mistaken for lizards. Only two species of salamanders (both in the family Ambystomatidae) occur in Nebraska. The not-infrequent references to "mud puppies" in the popular press apply to larvae or to larviform individuals of the tiger

salamander rather than to true mud puppies or water dogs (family Proteiidae).

1. *Ambystoma texanum* (Small-mouth Salamander)

The small-mouth salamander is known from only two localities in southeastern Nebraska (Fig. 1) but probably occurs throughout the intervening area. These animals are small as adults (100 to 130 mm in total length) and have a drab coloration (black to dark brown with gray flecks). These animals are most likely to be encountered in the spring when they move about at night traveling to and from breeding ponds. By day, they can be found beneath boards, rocks, and logs, most easily in the spring near breeding ponds.

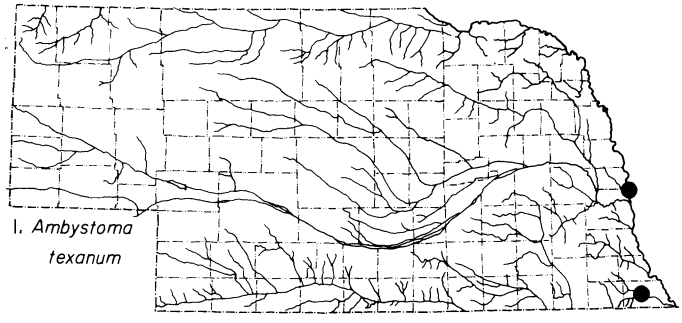

FIGURE 1. Locality records for *Ambystoma texanum* in Nebraska.

2. *Ambystoma trigrinum* (Tiger Salamander)

The tiger salamander is statewide in distribution (Fig. 2) but is infrequently encountered. Specimens turn up having fallen into window wells or in basements. During the spring, adults can be found moving about, especially on rainy nights. Less frequently, tiger salamanders are encountered under rocks or boards, in cisterns, and beneath windrows of alfalfa or hay. Most observations of these animals are sightings of the immature stages (larvae) or of sexually mature individuals that fail to undergo transformation (larviform individuals). Larvae and larviform individuals are alike in having three pairs of feathery gills emerging from the posterior end of the head and neck. These individuals also have membranous fins on the tail and a fin extending over the body. Only rarely will a larviform individual be encountered with a color pattern. Usually, these animals are monotone (cream, brown, or black) with reddish gill filaments. In contrast to larviform individuals, transformed individuals lack fins and gills. These animals also have a color pattern consisting of black, brown, and tan and/or yellow. In extreme eastern Nebraska, the animals are olive to yellowish brown marbled or reticulated with dark brown or black. These animals often appear to be spotted above and on the tail (all spots small). Over most of Nebraska, the pattern consists of a few large olive to yellowish spots on the back and olive to yellowish bands on the tail of a dark brown or black animal.

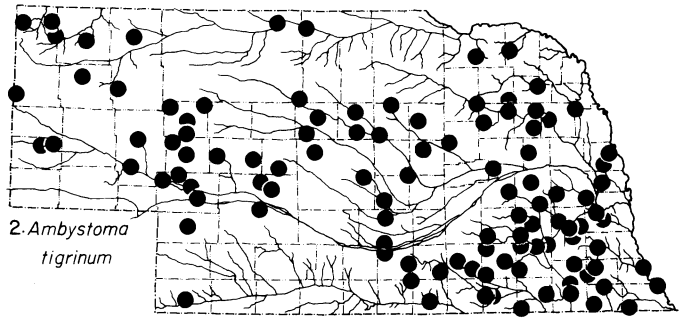

FIGURE 2. Locality records for *Ambystoma tigrinum* in Nebraska.

Tiger salamanders metamorphose from the larval form at standard lengths (tip of snout to end of anal opening) of 54 to 70 mm (total lengths of 92 to 137 mm). Sexual maturity is achieved at standard lengths of 83 to 95 mm (total lengths of 152 to 170 mm). Adult males are 86 to 127 mm in standard length (average 106 mm) and 155 to 240 mm total length (average 194 mm). Adult females are 83 to 119 mm standard length (average 101 mm) and 152 to 207 mm total length (average 178 mm). The sexually mature larviform individuals achieve sexual maturity at about the same size as those that transform, but the largest tiger salamanders found in Nebraska are larviform individuals (144 mm standard length, 269 mm total length).

Adult larviform individuals will undergo transformation in response to a variety of stimuli. Both larviform and transformed individuals may be found in the same breeding ponds and they apparently interbreed. So far as is known, all tiger salamander populations in Nebraska breed in the early spring. Larviform populations are not known from extreme eastern Nebraska (subspecies *A. t. tigrinum*) but are commonly encountered over the remainder of the state (subspecies *A. tigrinum mavortium* and *A. tigrinum melanostictum*).

FROGS AND TOADS (Order Anura)

Eleven species of frogs and toads occur in Nebraska. These animals belong to five families. The true toads (Bufonidae) are represented by three species of *Bufo*, which are easily recognized by the parotoid glands found on the shoulder or side of the neck. Three species of tree frogs (Hylidae) are found in Nebraska. These are not so easily recognized because only one species is arboreal (the other two are terrestrial or aquatic). Tree frogs are recognized as such because they have an extra element in their digits (intercalary phalanx). A single narrow-mouth toad (Microhylidae) occurs in Nebraska. It is distinctive in having a small, pointed head and a fold of skin across the

posterior end of the head. One species of spadefoot toad (Pelobatidae) occurs widely in Nebraska. These animals have vertical pupils (unlike any other Plains frog or toad). Three species of true frogs (Ranidae) occur in Nebraska. These animals have nearly full webbed hind feet and are unlikely to be confused with any other frog or toad except for the aquatic cricket frog (Hylidae). Cricket frogs have small digital pads as do all tree frogs whereas the true frogs have simple digits ending in points.

3. *Acris crepitans* (Northern Cricket Frog)

Cricket frogs are small (17 to 32 mm total length) with fully webbed hind feet. The back is warty and lacks dorsolateral folds (unlike juvenile *Rana blairi* or *Rana pipiens*). The dorsum is gray to brown with darker blotches; the venter is white. A useful behavioral trait will aid in the identification of many individuals disturbed along streams and ponds. When disturbed, these small frogs jump into the water and quickly swim back to shore. The larvae are easily recognized because the tip of the tail is black. Breeding occurs in late spring and early summer. The call of the male is like the sound produced by shaking a few pebbles in one's hand.

The cricket frog occurs primarily in eastern Nebraska (Fig. 3), but also is distributed westerly along several rivers. Only in eastern Nebraska is this frog found around ponds and lakes away from streams and rivers.

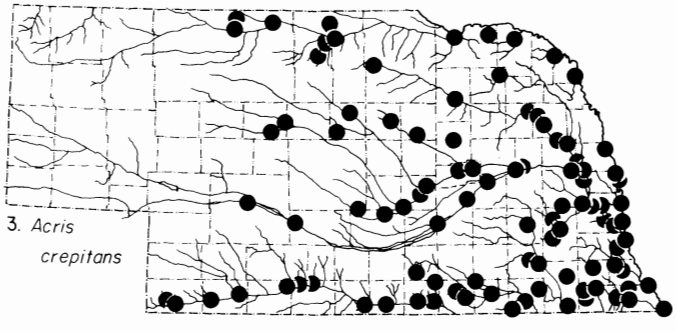

FIGURE 3. Locality records for *Acris crepitans* in Nebraska.

4. *Bufo americanus* (American Toad)

Although reported from Nebraska by Hudson (1942), the specimens upon which Hudson based his report are *Bufo woodhousii* not *Bufo americanus*. Gibilisco (1975) found specimens of toads very much like *B. americanus* near Fontanelle Forest in Sarpy County (Fig. 4). His study was an effort to measure the degree of hybridization between *B. americanus* and *B. woodhousii* suggesting that some past or present hybridization has occurred (is occurring) in extreme eastern Nebraska between Fort Calhoun and Auburn. *Bufo americanus* readily hybridizes with *Bufo woodhousii*; nevertheless, the two can be distinguished in that the warts on the shank are larger than those on the thigh in *B. americanus* (but not in *B. woodhousii*), the parotoid glands are kidney-shaped and separated by less than a parotoid gland length in *B. americanus*, and the venter is boldly and profusely spotted or marbled in *B. americanus* (unspotted or with a few tiny spots in the center of the chest in *B. woodhousii*). The call of *B. americanus* is a trill lasting at least 4 seconds whereas that of *B. woodhousii* lasts less than 2.7 seconds. The status of *B. americanus* in Nebraska and its possible introgression with *B. woodhousii* is in need of further study.

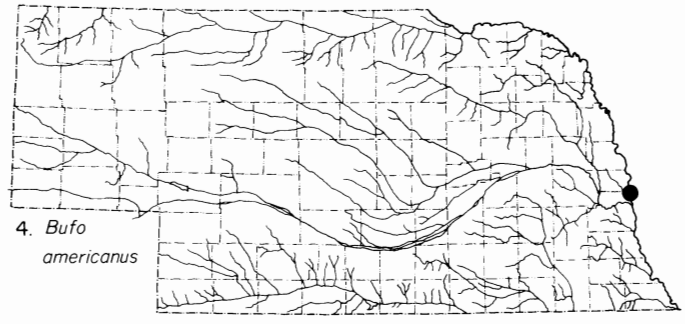

FIGURE 4. Locality records for *Bufo americanus* in Nebraska.

5. *Bufo cognatus* (Great Plains Toad)

The Great Plains toad is easily distinguished from the other two *Bufo* species found in Nebraska by virtue of its color pattern (olive with large diverging blotches on the back) and the form of its cranial crests (diverging between the eyes and united anteriorly in a bony "boss" on top of the snout). Its call is an octave higher than those of the other toads, and each call is a prolonged whistle (20 to 30 seconds in duration).

Great Plains toads occur throughout Nebraska except for the southwestern corner of the state (Fig. 5). Although they are common on the western edge of Lincoln, they are absent

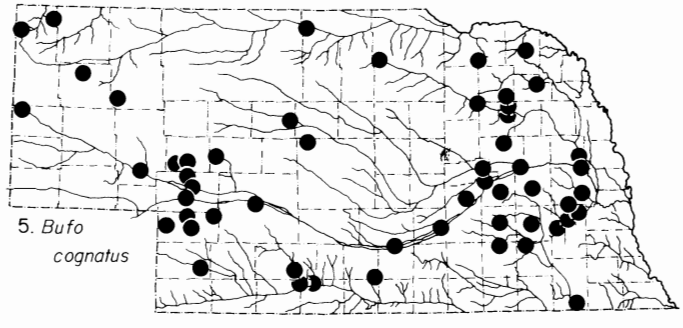

FIGURE 5. Locality records for *Bufo cognatus* in Nebraska.

east of the city. In most areas and at most times, the Great Plains toad is far less commonly encountered than the Rocky Mountain toad. Almost every specimen I or my students have found has been encountered during or following very heavy summer or late spring thunder storms. Driving at night following such storms allows quick census of *B. cognatus* populations because their loud voices are audible at distances in excess of 3 km. These animals breed in temporary bodies of water rather than more permanent ponds and lakes. Their tadpoles undergo rapid development (approximately 1 mo) and the small toadlets disperse from the breeding pools into the adjacent grasslands. Adult males are 52 to 78 mm snout-vent length; females are 62 to 77 mm snout-vent length.

6. *Bufo woodhousii* (Rocky Mountain Toad)

This is the garden, or common, toad, encountered throughout Nebraska (Fig. 6). During the spring, individuals are readily encountered crossing the roads or calling at breeding sites. During the summer, individuals are common around yards and gardens; beneath rocks, logs, or boards; or sitting at night near lights. During the late summer and fall, hundreds of individuals can be encountered along the river courses in Nebraska. Adult males are 58 to 88 mm snout-vent length (average 74 mm); adult females are 63 to 113 mm (average 85 mm).

Rocky Mountain toads are brown to reddish brown with small brown spots on the back (normally a single wart per spot); the venter is white with no dark markings or with a single, dark brown spot in the center of the breast). The concealed surfaces of the hind legs are yellow with darker marbling. The Rocky Mountain toad breeds in pools created with the fall of water levels following spring flooding of rivers. The isolated pools formed on the sandy ribbons of Nebraska's rivers provide thousands of breeding sites for these toads. Rocky Mountain toads also utilize stock ponds and lakes for breeding in contrast to the Great Plains toad. Eggs are laid in long strings, and the tadpoles hatch quickly. The small tadpoles (black or dark brown with clear fins) school and tend to remain near the bank (in warm water); they grow quickly,

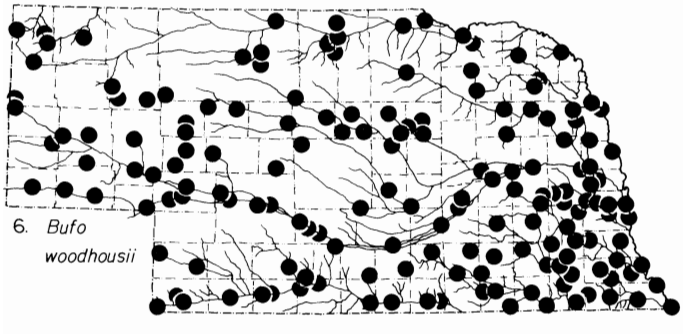

FIGURE 6. Locality records for *Bufo woodhousii* in Nebraska.

acquire a paler coloration (and spots), mottling on the fins, and metamorphose in 45 to 60 days.

7. *Gastrophryne olivacea* (Plains Narrowmouth Toad)

The narrowmouth toad is small (22 to 35 mm snout-vent length) and drab (gray, tan, or olive with tiny brown or black flecks). This species is known only from southern Gage County in Nebraska (Fig. 7). These small toads are ant-eaters and are usually encountered in semi-wooded pastures where they can be found beneath rocks or bark.

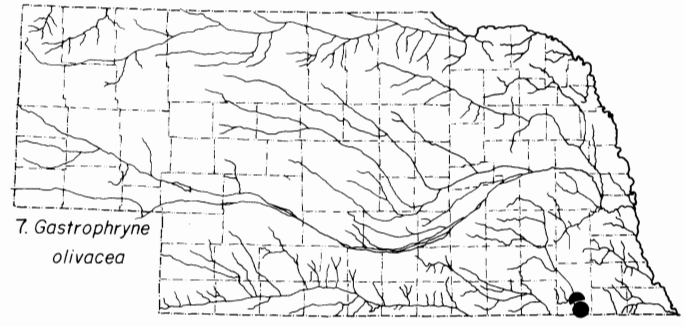

FIGURE 7. Locality records for *Gastrophryne olivacea* in Nebraska.

8. *Hyla chrysoscelis* (Western Gray Treefrog)

Gray treefrogs may also be green or brown with or without a pattern of blotches. Individuals are capable of considerable metachrosis through this color range. The concealed surfaces of the thighs, shanks, groin, and axilla are yellow or yellow-orange with brown reticulation. This is the only species of arboreal frog found in Nebraska, but individuals are likely to be found on the ground as well as in trees. Despite their name, gray treefrogs are not restricted in geography to the eastern fringe of the state where trees are the conspicuous plant lifeform. In the spring, males can be found calling on the ground near temporary bodies of water in the middle of a flooded field as well as in trees and bushes at the edge of a woodland pond.

Adult males are 31 to 47 mm snout-vent length (average 38 mm); adult females are 40 to 50 mm (average 44 mm). No other Nebraska frog has large disks on the digits. The white spot on the upper lip below the eye is also distinctive. Gray treefrogs breed in late spring or early summer. The egg mass is a surface film and because the surface of the water is the warmest and most highly oxygenated, the embryos rapidly hatch. The tadpoles have red or orange pigment on the tail fins. Metamorphosis occurs in about 50 days. When these frogs are breeding, specimens are easily encountered by tracing down their musical trills (most males encountered in Nebraska sit on the ground beside the ponds and pools in which they

breed). At other times during the growing season, the animals are very infrequently collected. Specimens have been found beneath rocks and in leaf litter in the forests of eastern Nebraska, in gardens, and on windows at night (perhaps seeking insects).

Hudson (1942) used the name *Hyla versicolor* for Nebraska populations. However, the gray treefrogs consist of a pair of species, one (*Hyla chrysoscelis*) a diploid and the other (*Hyla versicolor*) a tetraploid. The two are most easily distinguished on the basis of song. *Hyla chrysoscelis* has a "fast" call (higher pulse rate) compared to that of *H. versicolor.* All Nebraska populations have the high pulse rate of *H. chrysoscelis* rather than the lower rate of *H. versicolor. Hyla chrysoscelis* occurs in eastern Nebraska (Fig. 8). The western limit of this species is uncertain. Students have described frogs to me from areas north of Grand Island that are probably *H. chrysoscelis,* but to date no record has been verified from that region.

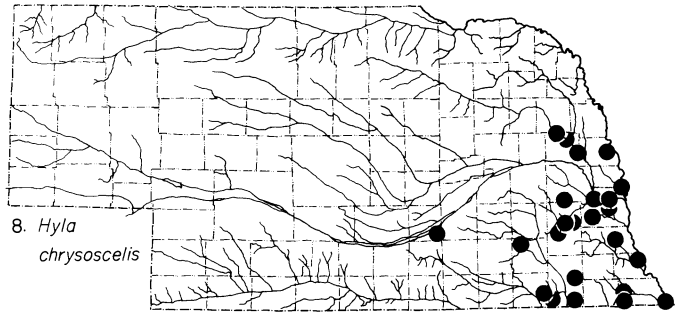

FIGURE 8. Locality records for *Hyla chrysoscelis* in Nebraska.

9. *Pseudacris triseriata* (Western Striped Chorus Frog)

This small terrestrial treefrog occurs throughout Nebraska (Fig. 9). Its insectlike trill (likened to the sound produced by running a thumb across the teeth of a comb) can be heard on any spring night in eastern Nebraska and following heavy thunderstorms during the summer months throughout the state.

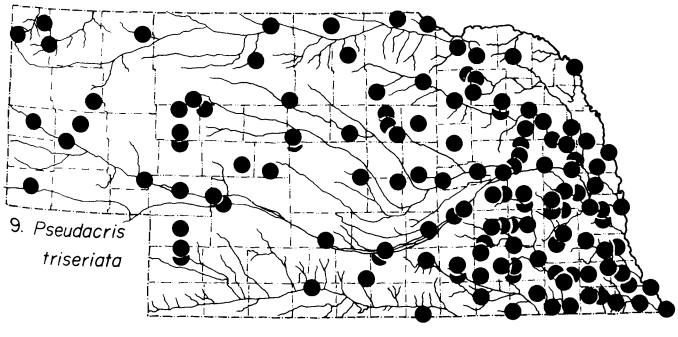

FIGURE 9. Locality records for *Pseudacris triseriata* in Nebraska.

Adults are small; males are 18 to 31 mm snout-vent length (average 26 mm); females are 23 to 34 mm (average 28 mm). The color is tan to light brown with three brown stripes (or rows of spots) down the back. The venter is white. Breeding primarily occurs in early spring (March through April), but choruses have been encountered as late as August following torrential storms. Approximately 45 days are required to complete development. Most breeding occurs in roadside ditches and marshes, but individuals are also heard calling in the flooded areas adjacent to permanent bodies of water.

10. *Rana blairi* (Plains Leopard Frog)

The plains leopard frog is likely to be confused only with the northern leopard frog because both are spotted and have light dorsolateral folds. The two are distinguished in that the ground color is tan or pale brown in *R. blairi* (green or dark brown in *R. pipiens*), the dorsal spots are round or slightly wider than long in *R. blairi* (elongate in *R. pipiens*), the dorsolateral folds are broken posteriorly and the broken fragment is inset or indented in *R. blairi* (fold not broken or inset in *R. pipiens*), the tympanum bears a white spot in *R. blairi* (none in *R. pipiens*), and the calls are a series of clucks in *R. blairi* (a snore in *R. pipiens*). Adult *R. blairi* are 50 to 95 mm snout-vent length.

The distribution of *R. blairi* in Nebraska is discontinuous. The species occurs south and east of a line extending from Grant (southwestern Nebraska) to Norfolk to Yankton, South Dakota. In addition, the species is known from isolated populations west and north of Lake McConaughy and in the upper drainage of the Elkhorn River (Fig. 10). *Rana blairi* is distributed in those areas having loess soils rather than in those having predominantly sandy soils (Lynch, 1978; Kruse, 1978). Over most of its range in Nebraska (south of the Platte River),

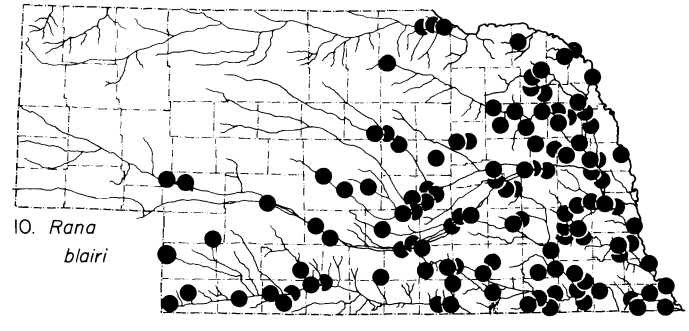

FIGURE 10. Locality records for *Rana blairi* in Nebraska.

R. blairi begins to breed in March, whereas in northern Nebraska it may not initiate breeding until late April or May. The egg mass is a globular mass containing 4,000 to 6,000 eggs attached to submerged vegetation. Larval life requires some 50 to 60 days. *Rana blairi* will breed in response to summer

thunderstorms; newly hatched tadpoles have been found as late as mid-September in the vicinity of Lincoln.

In the fall, young and adult plains leopard frogs are easily encountered along streams and rivers and, in northeastern Nebraska, are found syntopic with *R. pipiens.* This ecologic sympatry is a summer and fall sympatry; during the breeding season, the two species scarcely overlap. The slight overlap that does occur results in the production of hybrids, which although fertile apparently have a reduced likelihood of breeding, producing what appears to be a stable zone of hybridization.

11. *Rana catesbeiana* (Bull Frog)

The bull frog is Nebraska's largest anuran. Its distribution is nearly statewide (absent from many areas of the Sand Hills away from rivers) (Fig. 11), but its distribution prior to activities by the Game and Parks Commission cannot be estimated. Sexual maturity is reached at snout-vent lengths of about 105 mm, but adults may reach snout-vent lengths of 190 mm.

Bull frogs are territorial and relatively few males at a pond breed with the available females. The egg masses are surface films which rapidly hatch. Larval development requires two seasons in Nebraska, and the tadpoles must overwinter. In the fall, tadpoles move from shallow areas to deeper ones and reverse the migration in the spring. The tadpoles are olive with numerous small, black spots. Upon transformation, the black spots are still evident, but as the frog grows, the spots diffuse. Adults are olive, green, or brown with reduced patterns (some have brown mottling). The ear of males is nearly as large as the eye, whereas in females it is about one-half the size of the eye.

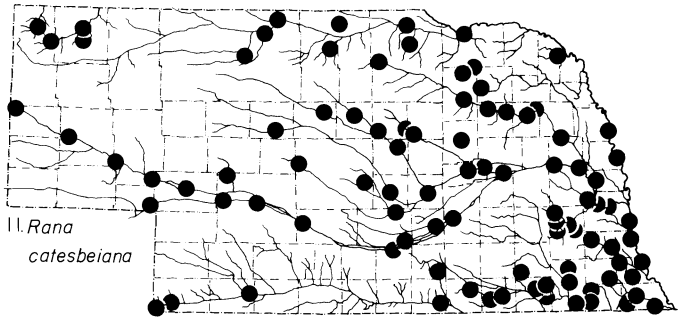

FIGURE 11. Locality records for *Rana catesbeiana* in Nebraska.

12. *Rana pipiens* (Northern Leopard Frog)

Northern leopard frogs are green or brown with elongate spots and complete dorsolateral folds. In most respects of their biology, they are like the plains leopard frog except that they generally breed earlier in those areas where the two species occur together (apparently related to temperatures rather than to competition). This is the only leopard frog in the marshes and ponds of the Sand Hills. The distribution of *R. pipiens* in Nebraska is discontinuous (Fig. 12). The frogs occur along Lodgepole Creek in the Panhandle and north of the North Platte River (rarely found along the river). They occur throughout the Sand Hills in the sandy streams and marshes and extend easterly to the Missouri River. Isolated populations occur in the mid-Platte area (Buffalo County), in the Sand Hills isolate in Merrick, Nance, and Platte counties, and in Colfax County.

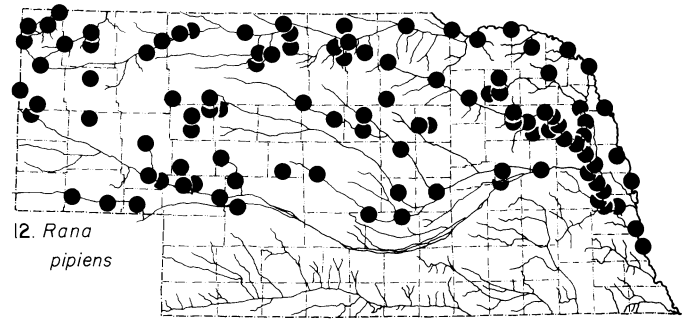

FIGURE 12. Locality records for *Rana pipiens* in Nebraska.

13. *Spea bombifrons* (Plains Spadefoot Toad)

The plains spadefoot is easily recognized by virtue of having vertical pupils (horizontal in other Nebraska frogs) and in having a fleshy boss (raised area) between the eyes. Adults are 41 to 58 mm snout-vent length. These toads are gray to brown (rarely greenish) with irregular darker markings and orange warts above; the ventral surfaces are white. Between two and four cream stripes are evident on the back. The inner edge of the foot bears a large, heavily keratinized tubercle (the spade) which is used in burrowing.

The plains spadefoot occurs throughout Nebraska except in the southeastern corner of the state (Fig. 13). Its geographic

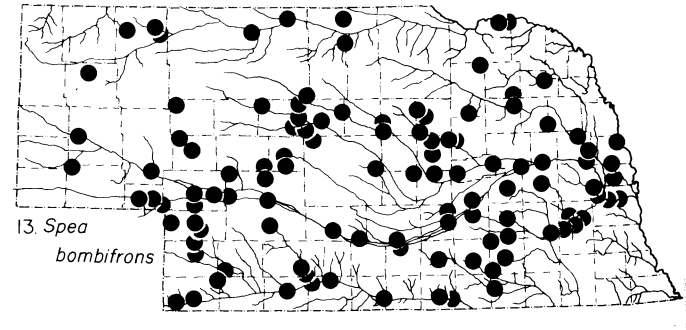

FIGURE 13. Locality records for *Spea bombifrons* in Nebraska.

distribution closely parallels that of the Great Plains toad (*Bufo cognatus*); this association is continued ecologically as well. These two species utilize the ephemeral ponds that form following heavy summer thunderstorms. Each quickly moves to the breeding pool, calls for a few nights, deposits eggs, and moves back to the prairies. The eggs hatch quickly and the developmental period for the larvae is brief (in spadefoot toads, normally less than 30 days). Such a breeding strategy allows these species to occupy areas where rainfall is intermittent and somewhat unpredictable. Larvae of the plains spadefoot toad are frequently cannibalistic, preying on one another as well as any other amphibian larvae that happen to coexist with them. Specimens in aquaria readily seize (and kill) small tadpoles.

TURTLES (Order Chelonia)

Only eight species of turtles are known from Nebraska. Hudson's (1942) record of *Chrysemys scripta* (as *Pseudemys scripta*) is here rejected because no additional specimen has been found and the single specimen he reported was likely an escaped pet. Four families of chelonians make up the Nebraska fauna. A single representative of the snapping turtle family (Chelydridae), a single mud turtle (Kinosternidae), two softshell turtles (Trionychidae), and four pond turtles (Emydidae) comprise the turtle fauna. By far the most distinctive are the softshell, or pancake, turtles. All other turtles have horny scales (shell lamellae). Trionychids are also distinctive in having fleshy lips and in having only three claws on each foot. Snapping turtles are most easily recognized by virtue of their long tails (about as long as the shell) and small cruciform plastra (underside of the shell). Mud turtles have barbels on the chin and only 23 marginal scutes. The pond turtles include both aquatic and terrestrial representatives (they have 25 marginal scutes).

14. *Chelydra serpentina* (Snapping Turtle)

These large turtles (largest Nebraska specimen has a shell length of 42 cm) are not easily confused with anything else by virtue of having a tail nearly as long as the shell, large heads, and greatly reduced plastra. The shell of adults varies from black to medium brown and may support a growth of algae. Juveniles have a black to dark brown shell with a light spot in each marginal scute. The upper shell bears three keels (most prominent in smaller specimens). At hatching, snappers are 25 to 30 mm in carapace length; most adults are 200 to 300 mm in carapace length.

Snapping turtles are statewide in distribution and found in most permanent aquatic habitats (Fig. 14). The paucity of locality records reflects an aversion to collecting and storing large specimens.

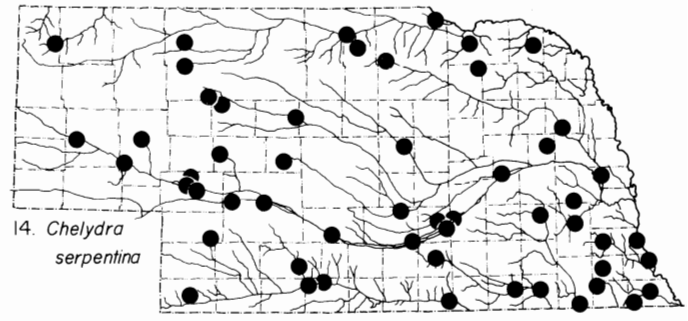

FIGURE 14. Locality records for *Chelydra serpentina* in Nebraska.

15. *Chrysemys picta* (Painted Turtle)

Painted turtles are unlikely to be confused with any other turtle in Nebraska so long as the plastron is verified to be not hinged (hinged in *Emydoidea blandingii* and *Kinosternon flavescens*, both of which also have smooth upper surfaces). The shell is olive or brown with a faint network of darker pigment; the plastron is reddish with a central olive and black figure having outward extensions toward the marginals. There are two yellow spots on each side of the head. At hatching, painted turtles are brightly colored and only 22 to 25 mm shell length; adults are 125 to 180 mm in shell length. The claws on the forelimbs are very long in adult males. Specimens from the Sand Hills have markedly deeper shells than do those from elsewhere in Nebraska.

The painted turtle is statewide in distribution (Fig. 15).

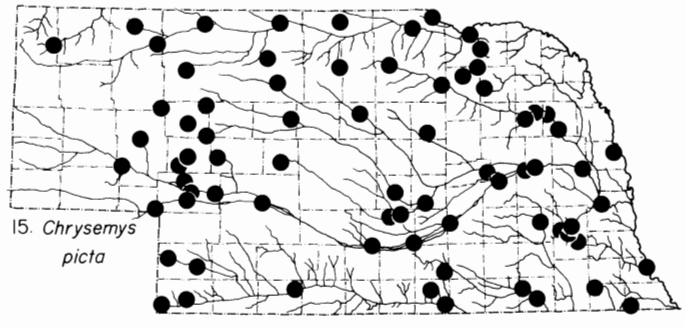

FIGURE 15. Locality records for *Chrysemys picta* in Nebraska.

16. *Emydoidea blandingii* (Blanding's Turtle)

Blanding's turtles are the prettiest of the turtles found in Nebraska. They are shy and retiring animals and are easily overlooked. The dorsum is black or brown with numerous small, yellow spots in adults (juveniles lack the yellow spots and have proportionately long tails). The chin and underside of the neck are bright yellow (true also for juveniles). The

plastron is yellow with large black blotches. Blanding's turtles have a hinged plastron (as do *Kinosternon flavescens* and *Terrapene ornata*). At hatching they are 26 to 29 mm in shell length; adults 125 to 200 mm shell length.

Blanding's turtle occurs in northern Nebraska from the Missouri River west to the western edge of the Sand Hills (Fig. 16).

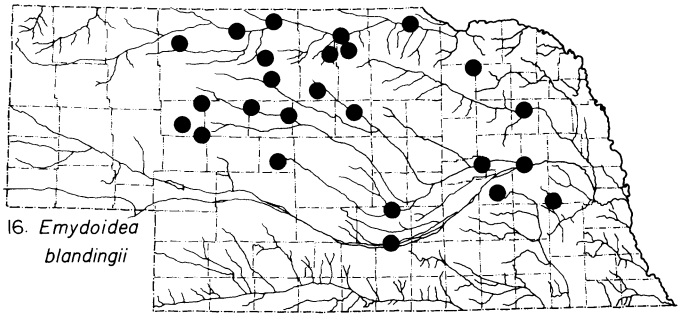

FIGURE 16. Locality records for *Emydoidea blandingii* in Nebraska.

17. *Graptemys pseudogeographica* (False Map Turtle)

The map turtle occurs in eastern Nebraska in the Missouri River and associated oxbow lakes (Fig. 17). A record for Branched Oak Lake in Lancaster County is the only outlying record aside from Hudson's (1942) record for Hall County. These are river and large lake turtles. Adult males are 90 to 115 mm in shell length; adult females are 125 to 180 mm. The carapace is brown, and the head and neck bear numerous yellow stripes. The knobs on the center of the back are prominent in juveniles and in males; in females, these become obliterated with age. Map turtles have large, well-webbed feet and saw-toothed posterior margins to the shell.

Despite the ill-treatment of the Missouri River, the map turtle remains common.

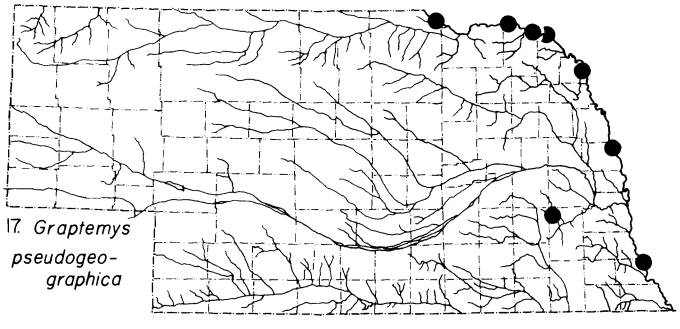

FIGURE 17. Locality records for *Graptemys pseudogeographica* in Nebraska.

18. *Kinosternon flavescens* (Yellow Mud Turtle)

The yellow mud turtle is a shy and retiring species seldom encountered. The carapace and upper surfaces are dark brown with no pattern. The chin and throat are yellowish (not so intense as in *Emydoidea*). The carapace is usually slightly depressed. Adults are 100 to 125 mm in shell length.

The yellow mud turtle occurs throughout the Republican River drainage in Nebraska and also is encountered in non-alkaline ponds and lakes in the Sand Hills (Fig. 18). Hudson's (1942) skeptical treatment of the records from Valentine was perhaps appropriate before the species was discovered in several other Sand Hills Lakes.

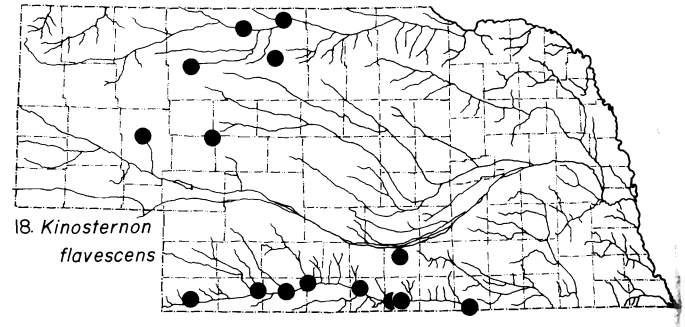

FIGURE 18. Locality records for *Kinosternon flavescens* in Nebraska.

19. *Terrapene ornata* (Ornate Box Turtle)

The box turtle is small (adults 100 to 125 mm in shell length) with a high shell and a hinged plastron. Males have orange or reddish scales on the forelimbs and neck and a red eye (yellow-brown in females). The shell is dark brown or black with radiating yellow lines.

The ornate box turtle is native to much of Nebraska but is absent from northwestern Nebraska (Fig. 19). Its distribution is opposite that of the tall-grass prairies in eastern Nebraska.

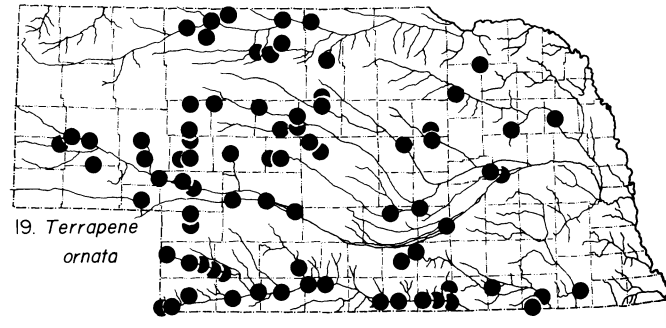

FIGURE 19. Locality records for *Terrapene ornata* in Nebraska.

These slowly growing animals are common throughout the Sand Hills where they are especially conspicuous following rains. Their reduced abundance in areas away from the Sand Hills may partly be due to ecologic factors, but is surely due in part to the intersection of their slow rate of recruitment of young and the indifference of most drivers to these small organisms as they cross highways.

20. *Trionyx muticus* (Smooth Softshell)

The smooth softshell (or pancake) turtle is less common than the following species. Smooth softshells are mostly easily recognized by the absence of tubercles on their carapaces (*see* spiny softshell). Juveniles and males are olive to brown with slightly darker flecks whereas females are mottled with browns, gray, and olive. The limbs are not striped or spotted. Adult males are 120 to 175 mm in shell length; females are 180 to 350 mm shell length.

Smooth softshells are known from the Missouri River and other large rivers in eastern Nebraska (Fig. 20).

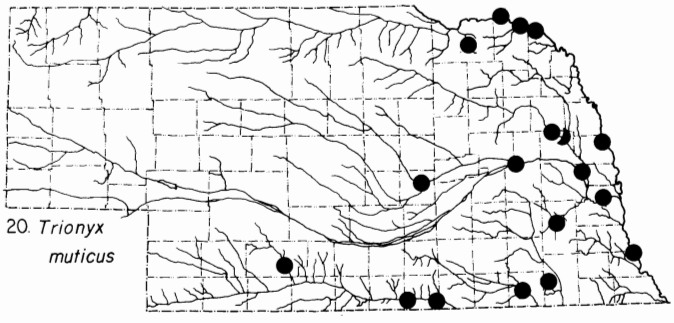

FIGURE 20. Locality records for *Trionyx muticus* in Nebraska.

21. *Trionyx spiniferus* (Spiny Softshell)

Spiny softshells have numerous tubercles on the anterior edge of the carapace and a sandpapery texture to the remainder of the carapace. The limbs are marbled with brown and yellow. The body is olive to pale brown above with darker markings forming a broken line around the perimeter of the carapace and ocelli scattered on the back (ocelli more broken-up in adult females which may have a carapace pattern rather similar to that of *T. muticus*). Adult males are 125 to 200 mm in shell length; females are 175 to 430 mm shell length.

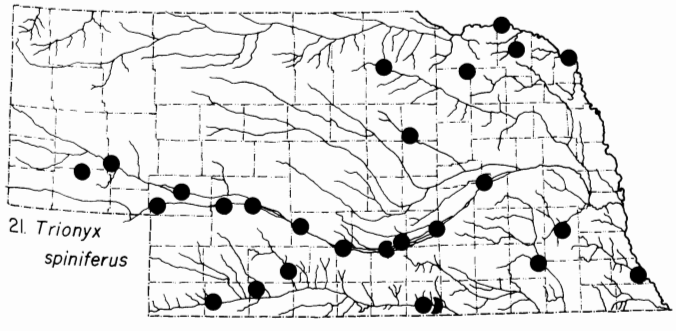

FIGURE 21. Locality records for *Trionyx spiniferus* in Nebraska.

Spiny softshells occur in major rivers and many smaller streams in Nebraska (Fig. 21). Both species occur in reservoirs although the spiny softshell is the more common.

LIZARDS (Order Lacertilia)

The 10 species of Nebraska lizards are grouped as an order merely for convenience because the order is not a logical grouping. Hudson (1942) reported nine of the species here reported. The tenth, *Sceloporus graciosus,* is reported from Nebraska for the first time.

The 10 lizards belong to four families. *Ophisaurus attenuatus,* the glass snake, is a member of the family Anguidae. It has eyelids, ear openings, and a long tail as do other animals traditionally grouped as lizards. The other lizards are more conventional in having four limbs with digits and claws. Four species of the family Iguanidae occur in Nebraska (fence lizard, earless lizard, and horned toad). Four species of skinks (Scincidae) occur in Nebraska. These animals have smooth, shiny scales underlaid by osteoderms. Skinks have relatively short limbs and often move in a fashion very similar to snakes. A single species of Teiidae, *Cnemidophorus sexlineatus,* also occurs in Nebraska. This lizard is a rapid-running lizard with a long, slender tail.

22. *Cnemidophorus sexlineatus* (Six-lined Racerunner)

Racerunners are most easily recognized, once in hand, in having the back, sides, and limbs covered with very small (granular) scales and the belly with rows of large plates. These lizards are dark brown with six pale stripes running the length of the body. The chin and venter are lightly washed with blue in males. Racerunners are most easily identified because the tail is very long (more than twice as long as the body). Nebraska specimens reach lengths of about 230 mm (body plus tail); hatchling specimens are 76 to 78 mm total length (head and body 31 to 32 mm, tail 45 to 46 mm).

Racerunners are statewide in distribution although they may be locally abundant or extremely rare (Fig. 22). The lizards are most frequently encountered along the many rivers of Nebraska where the lizards actively forage in the sparse vegetation on sandy soils. Racerunners also are common in the Sand Hills and especially easy to see on blowouts and in areas

with sparse ground cover. These lizards can be found only rarely in the heavily wooded areas in eastern Nebraska.

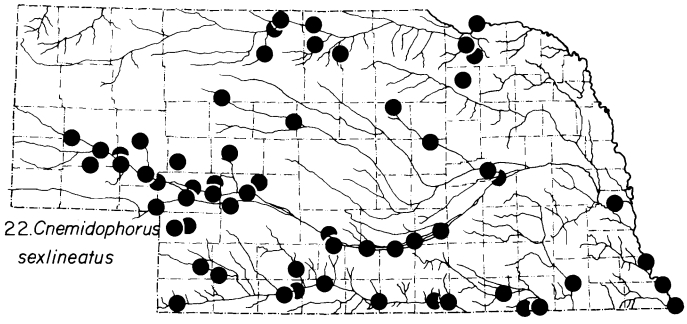

FIGURE 22. Locality records for *Cnemidophorus sexlineatus* in Nebraska.

23. *Eumeces fasciatus* (Five-lined Skink)

Five-lined skinks have five white to cream stripes on the body (one on the midline and two on each side of it). Juveniles have bright blue tails and a black ground color. Adults are paler and have, in the case of males, less distinct stripes (the stripes darken with age).

Five-lined skinks only barely occur in Nebraska. All known specimens have been secured in a few square miles of wooded terrain along the Missouri River, southeast of Rulo, in Richardson County (Fig. 23). Adults reach total lengths of 125 to 150 mm.

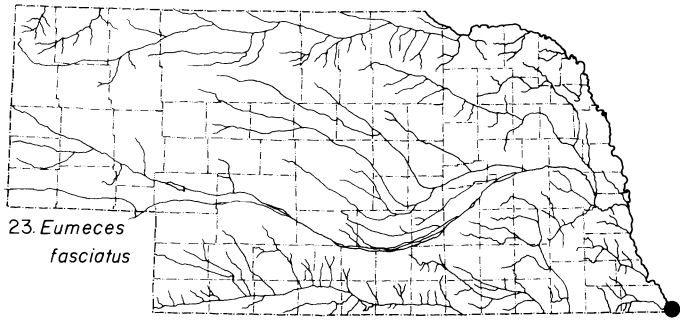

FIGURE 23. Locality records for *Eumeces fasciatus* in Nebraska.

24. *Eumeces multivirgatus* (Many-lined Skink)

Most individuals are striped. The head, body, and tail bear many light and dark stripes. A prominent stripe occurs on the third row of body scales (counting from the midline of the back). The tail is brilliant blue in hatchlings. In several western Nebraska localities, a patternless morph is known. These individuals lack stripes and are tan. The patternless skinks are known from Arthur, Brown, and Keith counties; the patternless morph is equally common in males and females. Adult females are slightly larger than males. Adult males have body lengths (excluding tails) of 46 to 57 mm whereas adult females are 61 to 69 mm in body lengths. The tails are long, but are frequently broken (and regenerated). Only eight of 22 adult males have complete tails (tail about 1½ times as long as body). A single adult female of six has a complete tail.

The many-lined skink is a common, albeit seldom observed, lizard in the Sand Hills (Fig. 24). They are likewise abundant in the Panhandle. Specimens are less frequently obtained elsewhere. The lizard occurs in the sage-sandhills in southwestern Nebraska and is found on some, not all, Sand Hills isolates in central and northwestern Nebraska.

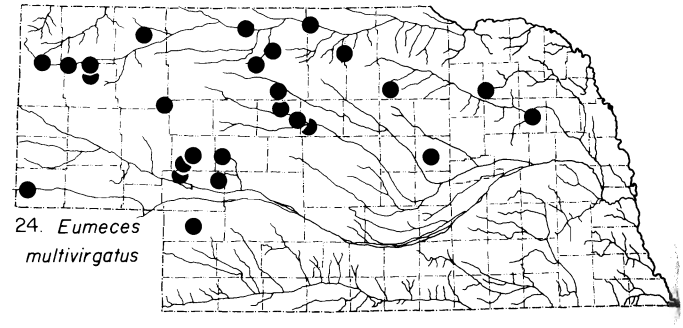

FIGURE 24. Locality records for *Eumeces multivirgatus* in Nebraska.

25. *Eumeces obsoletus* (Great Plains Skink)

This is the largest skink found in Nebraska. Males reach head and body lengths of 120 mm and females reach 126 mm. Few specimens have complete (and unregenerated) tails. The largest such specimen is a female 314 mm total length. Not only are these lizards long, they are heavy-bodied animals. Unlike other skinks in Nebraska, the scales on the flanks are arranged in slanted (oblique) rather than straight rows. In color, Great Plains skinks are easily recognized as well because they are pale tan to pale gray with a black or brown rim to

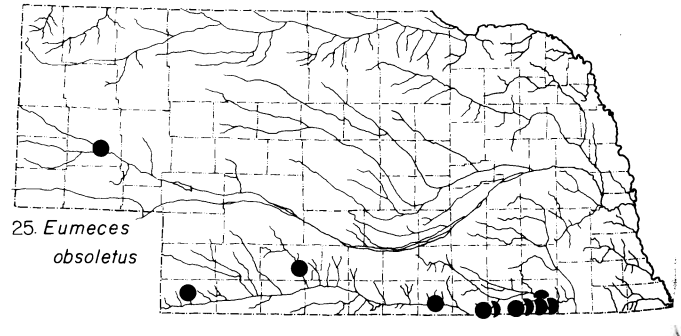

FIGURE 25. Locality records for *Eumeces obsoletus* in Nebraska.

each scale (appear spotted). The juveniles are black with white and orange spots on the head and a blue tail.

Aside from a record in the Panhandle, Great Plains skinks are known in Nebraska from the Republican River drainage and Thayer and Jefferson counties (Fig. 25). All records are for extreme southern Nebraska. The only unusual record is for Morrill County. The record is based on two adults secured during paleontological excavations in the 1930s. The record is accepted as valid, in part, because I observed, but failed to capture, a Great Plains skink at another locality in northern Morrill County in 1978.

26. *Eumeces septentrionalis* (Prairie Skink)

This is another striped skink, but one having very dark dorsolateral bands as well (such bands do not occur in the many-lined or five-lined skinks). The light stripe providing the dorsal border to the dark flank band occurs on the fourth (or fourth and fifth) scale row (counting from the midline of the dorsum). Juveniles have bright blue tails but otherwise look like adults. Adult males are 59 to 79 mm in body length and adult females are 64 to 88 mm; the tail is about 1½ times the length of the body.

Eumeces septentrionalis occurs in eastern Nebraska over an area slightly more extensive than the original tall-grass prairies (Fig. 26).

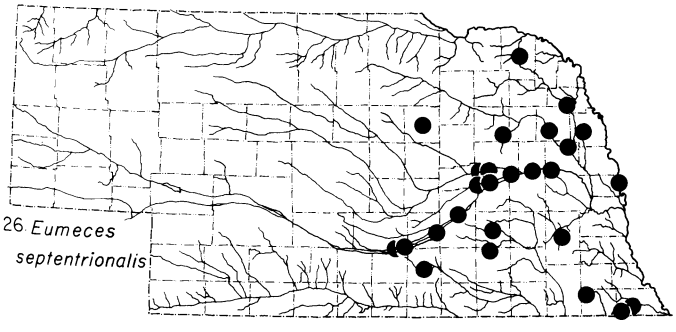

FIGURE 26. Locality records for *Eumeces septentrionalis* in Nebraska.

27. *Holbrookia maculata* (Lesser Earless Lizard)

This small lizard is most easily identified because it lacks an external opening to the ear, hence its common name. It is also easily recognized because the scales lining the lips are strongly slanted. These lizards are not brightly colored. Adults and young are tan, cream, or pale brown with slightly darker blotches on the back. Adult females in breeding condition have an orange wash about the face and continuing posteriorly along the flanks. Adult males have some blue behind the forearm. The tail is usually slightly shorter than the body in this species. Adult males are 33 to 56 mm in body length and adult females are 34 to 56 mm.

Holbrookia is most common in areas with sandy soils and sparse vegetation. These lizards are not common along rivers. Isolated populations occur on the Sand Hill isolates in central and northeastern Nebraska (Fig. 27). The record for Crete (Hudson, 1942) is doubtful.

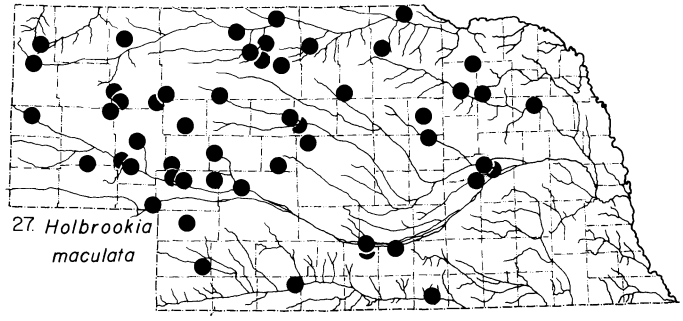

FIGURE 27. Locality records for *Holbrookia maculata* in Nebraska.

28. *Ophisaurus attenautus* (Slender Glass Lizards)

The only two specimens known were reported by Hudson (1942) from Franklin and Johnson counties (Fig. 28). This lizard has no legs but, unlike snakes, has eyelids, ear openings, and a very long tail. Glass lizards have another peculiar feature—a deep groove bearing smaller scales occurs on the lower flank of the body (lying essentially in the space between where the insertions of the fore and hind limbs should be).

Too little is known of this lizard in Nebraska to determine whether the species is now extinct (if so, probably a casualty of increased agricultural pressure) or if it is simply rare. These are the most northerly records in the Great Plains.

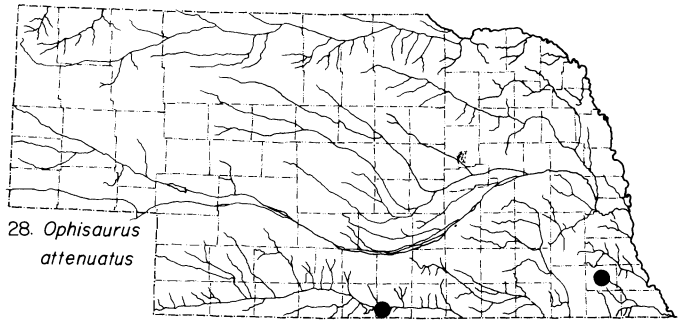

FIGURE 28. Locality records for *Ophisaurus attenuatus* in Nebraska.

29. *Phrynosoma douglassi* (Short-horned Horned Toad)

Horned toads are of course lizards but unlike most lizards present a dissonant body shape. These animals are greatly flattened and have short, broad bodies with small tails. Most members of the genus have sharp spines originating from the posterior margin of the head, but the short-horned lizard has only insignificant knobs. Adult males are 57 to 74 mm body length whereas females are 61 to 77 mm body length. These lizards are brown with darker brown blotches, and sitting against the similarly colored substrates of western Nebraska are nearly indistinguishable from the pebble-laden soils. This is the only lizard in Nebraska giving birth to young (all others lay eggs) and the only one to be a specialist in diet (ants).

Horned toads occur in the Panhandle in highlands away from the Platte River Valley (Fig. 29).

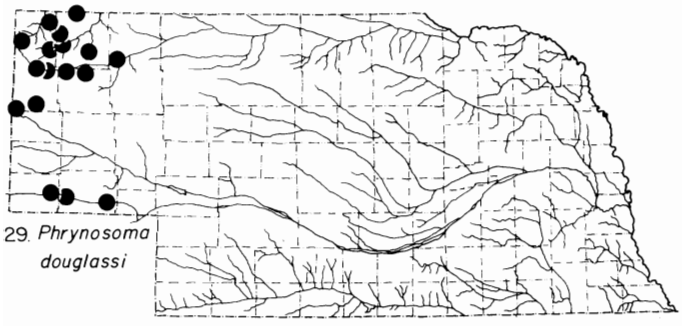

FIGURE 29. Locality records for *Phrynosoma douglassi* in Nebraska.

30. *Sceloporus graciosus* (Sagebrush Lizard)

The sagebrush lizard is here reported from Nebraska for the first time. Adult males are 33 to 55 mm in body length, whereas adult females are 49 to 58 mm. In Nebraska, these are pale lizards; the body color is pale gray with little indication of markings aside from the blue on flanks of adult males. The tail is 10 to 15 mm longer than the body. The scales on the back of the thigh are granular unlike the imbricate scales found on the back of the thigh in *S. undulatus.*

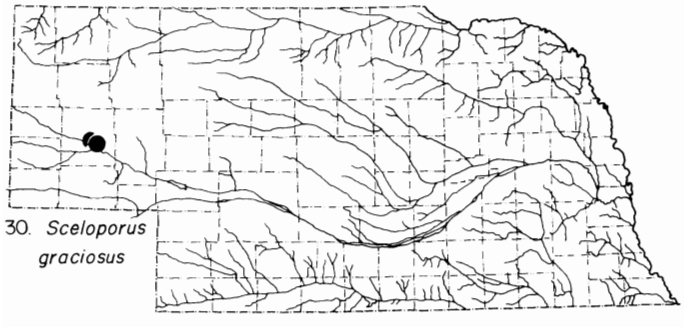

FIGURE 30. Locality records for *Sceloporus graciosus* in Nebraska.

Although widespread in the Rocky Mountain states, including Wyoming, this species is known only from two localities (4.8 km N, 2.4 km E Broadwater and 9.6 km N, 8.0 km W Broadwater) in central Morrill County in western Nebraska (Fig. 30). I have searched for it in many areas in Sioux, Kimball, and Cheyenne counties without success (aside from finding the other *Sceloporus*).

31. *Sceloporus undulatus* (Northern Prairie Lizard)

Sceloporus undulatus is gray to reddish brown with distinct cream dorsolateral stripes edged with dark brown or black spots. Males have blue flanks. The tail is slightly longer than the body. Adult males are 40 to 58 mm body length whereas adult females are 43 to 64 mm.

Prairie lizards are common in a variety of habitats, but especially in areas where they can retreat to protection of such structural features as *Yucca,* fence posts, and such trees as dot the prairies of Nebraska. The lizard is common throughout the Sand Hills and Panhandle and occurs on several of the Sand Hills isolates of central and northeastern Nebraska. Prairie lizards are also found in the western portion of the Republican River drainage (Fig. 31).

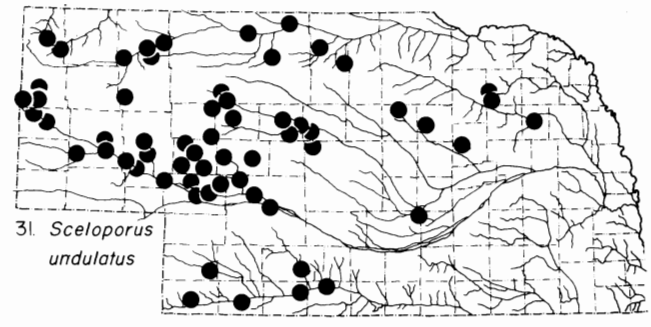

FIGURE 31. Locality records for *Sceloporus undulatus* in Nebraska.

SNAKES (Order Serpentes)

Twenty-nine species of snakes occur natively in Nebraska. All but four are members of the family Colubridae ("harmless" snakes). The other four species are venomous and placed in the family Viperidae (subfamily Crotalinae). Several species are quite small animals (total lengths less than 25 cm) and only a few normally achieve total lengths in excess of 122 cm. Contrary to popular belief, the cottonmouth moccasin (*Agkistrodon piscivorous*) does not occur in Nebraska. Its presence is maintained only by misidentifications of the common

watersnake (*Nerodia sipedon*) and misplaced enthusiasm. All Nebraska snakes have large scutes on the ventral surfaces (transverse scutes) and overlapping scales on the sides and back. The vipers are all pit-vipers (that is, have a facial pit between the eye and nostril); three normally have rattles at the end of the tail. The rattlesnakes are capable of producing a "buzz" as the tail is shaken, but other snakes also produce such a noise by vibrating their tails against the substrate (or rapidly releasing air). Sound alone is not an adequate identification of a pit-viper.

Identifying snakes requires making counts of various groups of scales and examining the form and disposition of teeth among their characteristics. The easiest means of identifying snakes is to take advantage of the relatively few color patterns they present and obtain further separations utilizing scutellation.

The types of pattern employed are: unicolor, banded, striped, and spotted (or blotched).

UNICOLOR: Snakes lacking specific markings are termed unicolor. These snakes may be brightly bicolored (different colors above and below) but are still termed "unicolor." Also included here are those snakes having a single mark (the pale ring around the neck of *Diadophis punctatus* and the black head of *Tantilla nigriceps*). There may be a subtle, but not readily defined, pattern (the thin lines of *Masticophis flagellum*). Any snake having a repeated set of markings down the length of the body belongs to the banded or spotted patterns. Two species (*Coluber constrictor* and *Elaphe obsoleta*) are unicolor as adults but are spotted as juveniles. Snakes characterized by unicolor patterns are *Carphophis amoenus, Coluber constrictor* (adults only), *Diadophis punctatus* (have a single neck band), *Elaphe obsoleta* (adults only), *Masticophis flagellum, Opheodrys vernalis,* and *Tantilla nigriceps.*

BANDED: These snakes have several bands of dark pigment extending across the dorsal surfaces (the markings may or may not be complete across the belly). If the snake appears banded anterior and spotted posteriorly, it is considered banded. Banded species are *Agkistrodon contortrix, Lampropeltis triangulum,* and *Nerodia sipedon* (anterior portion of body only).

STRIPED: Some of the most common species in Nebraska have three pale stripes running the length of the animal (one down the center of the back and one low on each side of the body). There are some other species in which the stripes are less distinct and restricted to one stripe down the back or a stripe on each flank. Only striped snakes have dark stripes on the belly. Striped snakes include *Regina grahami, Storeria dekayi, S. occipitomaculata, Thamnophis elegans, T. proximus, T. radix, T. sirtalis,* and *Tropidoclonion lineatum.*

SPOTTED: Spotted snakes have a row of spots down the center of the back (individual spots may extend some distance down the flank but never reach the ventral scutes) in addition to one or more rows of spots along the flanks. The spots on the flanks are not directly ventral to the spots on the back but rather alternate with the dorsal spots. Spotted snakes may have the markings on the tail arranged in bands. Spotted species are *Arizona elegans,* juvenile *Coluber constrictor, Crotalus horridus, C. viridis, Elaphe guttata,* juvenile *E. obsoleta, E. vulpina, Heterodon nasicus, H. platyrhinos, Lampropeltis calligaster, L. getulus, Pituophis catenifer,* and *Sistrurus catenatus.*

32. *Agkistrodon contortrix* (Copperhead Snake)

Copperheads are one of the four kinds of venomous snakes found in Nebraska. These beautiful animals are banded (11-15 dark body bands across a gray or tan body), with the bands being widest along the vertebral line and narrowest along the sides of the body. No other species has these hourglass-shaped, dark markings. Common watersnakes and eastern hognose snakes are sometimes confused with copperheads, but the former has more body bands (more than 20) and is slenderer, whereas the latter has a pale lip and is spotted. Copperheads are moderate-sized snakes (largest Nebraska specimen 920 mm total length). Like other vipers, but unlike most snakes, copperheads give birth to young.

Copperheads are known definitely only from southern Gage and Richardson counties of Nebraska (Fig. 32). Although not documented by museum specimens, the species may have occurred (and may yet occur) along the Missouri River bluffs as far north as the Platte River.

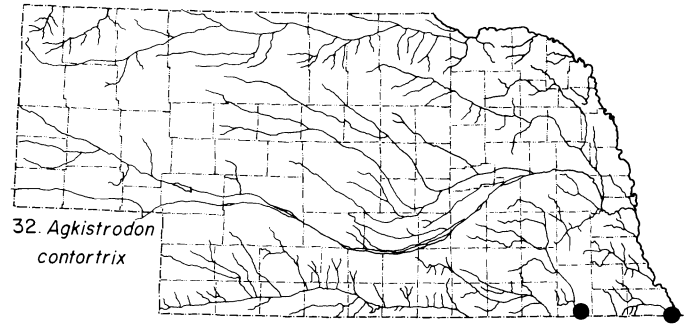

FIGURE 32. Locality records for *Agkistrodon contortrix* in Nebraska.

33. *Arizona elegans* (Faded or Glossy Snake)

These snakes are spotted, having 52-60 spots down the center of the back and 18-25 indistinct spots on the tail. The only spotted snakes having so many spots are juvenile *Coluber constrictor, Elaphe guttata, Lampropeltis calligaster,* and

Pituophis catenifer. Arizona elegans is easily distinguished because it has a uniformly white or cream belly. Adult snakes are 765 to 930 mm total length.

Glossy snakes are known in Nebraska only from Dundy County at localities within 10 km of the Kansas border (Fig. 33). Fewer than a dozen specimens have been found in the past 45 yr, most in the past 5 yr. These snakes are usually active only at night and are expected to be found in Chase and Hitchcock counties of Nebraska.

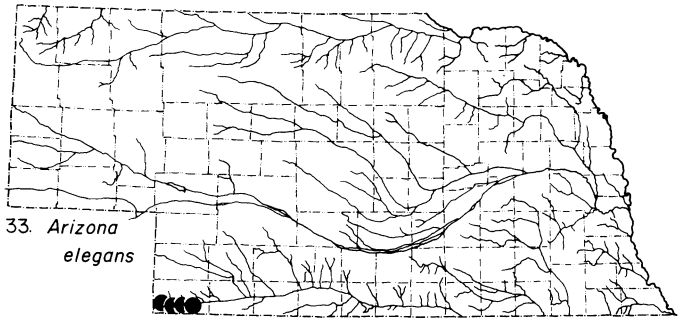

FIGURE 33. Locality records for *Arizona elegans* in Nebraska.

34. *Carphophis amoenus* (Worm Snake)

The worm snake is one of the few species found in Nebraska lacking spots, bands, or stripes. These snakes are nearly black above and bright salmon below. Worm snakes are not easily confused with any other. These snakes are burrowers and have very small eyes. The snakes are also small (largest specimen 332 mm total length) and have short, sharply pointed tails.

In Nebraska, worm snakes are known from the lower Platte valley, along the Missouri River bluffs, and in southern Richardson County (Fig. 34). These snakes occur only in areas having forests and retreat deep in the soil with the drying effects of summer.

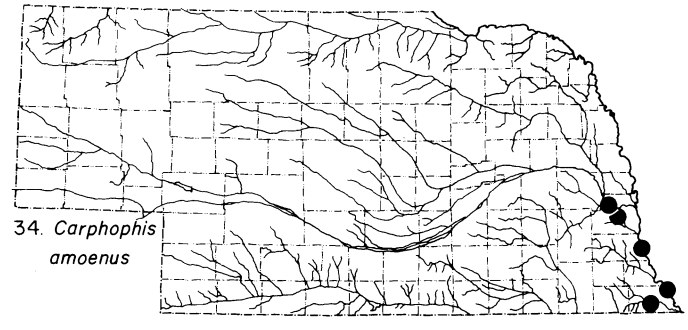

FIGURE 34. Locality records for *Carphophis amoenus* in Nebraska.

35. *Coluber constrictor* (Blue or Green Racer)

The racer is statewide in distribution (Fig. 35). Specimens from eastern Nebraska are darker ("blue racers") than those from the western two-thirds of the state ("green racers"). Adult snakes in eastern Nebraska are blue-black above whereas those from western Nebraska are greenish above (much paler snakes). In all populations the throat is white and the venter dull yellow. Juvenile racers are spotted (65-97 spots down center of back on body) and have numerous small spots on the ventral surfaces. Snakes having distinct spots are less than 420 mm total length. Those 330 to 550 mm total length have some indication of spotting, usually on the anterior portions of the body. Adult males reach body lengths of 793 mm (total length ca 1,040 mm). Ovigerous females are 467 to 970 mm in body length (total lengths 600 to 1,234 mm).

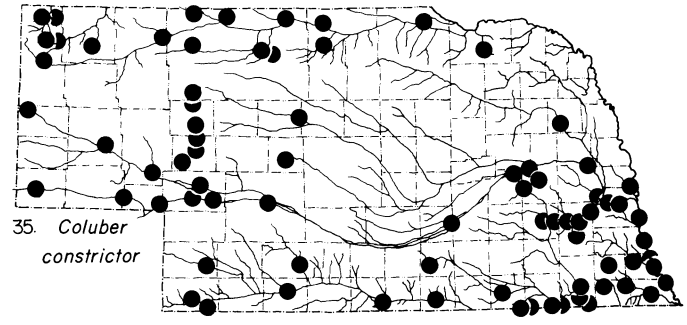

FIGURE 35. Locality records for *Coluber constrictor* in Nebraska.

Despite its scientific name, the racers are not constrictors. Nevertheless, they feed on a wide array of organisms (insects, frogs, lizards, snakes, and small mammals). The common name suggests that they are very rapidly moving snakes. On open ground they move about as fast as a man walks. However, in areas with brush and an uneven surface, they appear to travel more rapidly than humans.

36. *Crotalus horridus* (Timber Rattlesnake)

The timber rattlesnake is dark gray to brown with dark spots (or more posteriorly bands) edged with yellow to pale brown. The head is normally not marked and the tail is black. There is a reddish vertebral stripe in Nebraska specimens. Nebraska specimens have 22-25 spots down the center of the back. The largest specimens preserved at the State Museum are slightly longer than 1 m (1,050 mm total length) although I have encountered and released many adults in the 1,200 to 1,300 mm range in southeastern Nebraska. New-born young are 340 to 360 mm total length.

The timber rattlesnake is known from southern Gage County and from along the Missouri River bluffs from the

Platte River to the frontier with Kansas (Fig. 36). Recent visits to localities where timber rattlesnakes are known reveal the snakes are present in southern Gage and eastern Richardson counties. It may have been extirpated in other areas of eastern Nebraska.

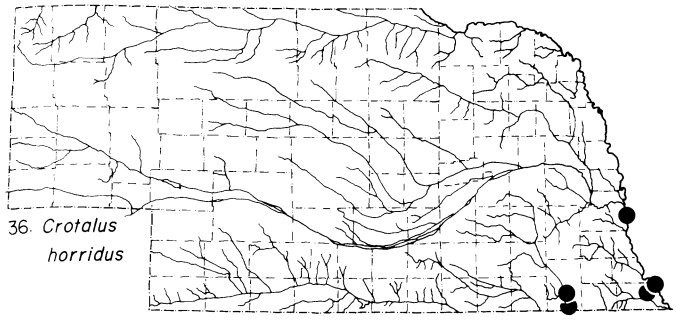

FIGURE 36. Locality records for *Crotalus horridus* in Nebraska.

37. *Crotalus viridis* (Prairie Rattlesnake)

The prairie rattlesnake is olive to pale brown with a row of 36-61 spots down the center of the back. The tail is banded (6-12 bands, more in males, which have slightly longer tails than do females). Slanting light and dark stripes occur on the face.

Despite numerous claims to the contrary, *Crotalus viridis* in Nebraska now (or in the recent past) probably does not exceed a total length of 1,200 mm. The largest specimens in the State Museum are males (the largest being 1,066 mm). Newborns are about 220 to about 240 mm in total length.

Crotalus viridis is distributed over the western two-thirds of Nebraska (Fig. 37), but is most common in areas having extensive rock outcroppings and dissected pasture lands.

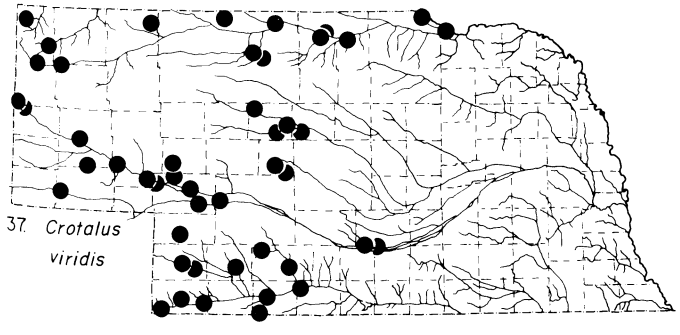

FIGURE 37. Locality records for *Crotalus viridis* in Nebraska.

38. *Diadophis punctatus* (Ringneck Snake)

Ringneck snakes are especially common, if not conspicuous, in the wetter areas of Nebraska. The snakes are blue-black above except for the presence of a yellow ring about the neck immediately behind the head. The venter is yellow anteriorly becoming more reddish orange posteriorly and flecked with black. The underside of the tail is brighter than any other part of the venter. When the snake is disturbed, it coils up the tail and turns it over exposing the bright colors there. Most adult males are 210 to 270 mm body length (250 to 330 mm total length). Females are only slightly larger (to 390 mm total length). Despite their small size, these snakes are among the longer lived snakes in the Plains; Fitch (1975) estimated that adults live to 15 or 16 yr old.

Ringneck snakes are especially common in mesic eastern Nebraska in the deciduous forests found there (Fig. 38). Records are also available from wooded areas along rivers out into central Nebraska.

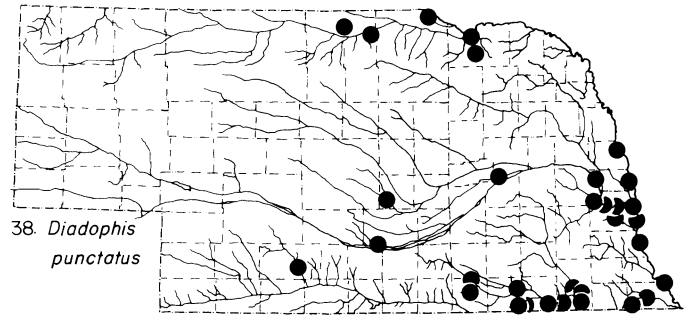

FIGURE 38. Locality records for *Diadophis punctatus* in Nebraska.

39. *Elaphe guttata* (Prairie Cornsnake)

The prairie cornsnake is much less brilliantly colored than the eastern cornsnake, but the color pattern is essentially the same. These snakes are blotched (41-56 blotches down the midline of the back on the body, 15-23 blotches or bands on the tail). The ground color is predominantly gray or tan and the blotches are brown, edged with black. The venter is heavily blotched, but the underside of the tail is

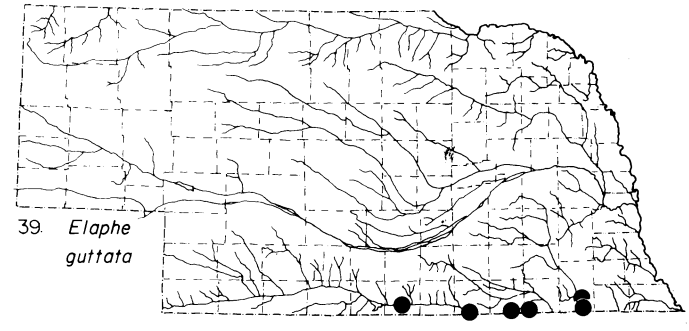

FIGURE 39. Locality records for *Elaphe guttata* in Nebraska.

striped. Adults are 600 to about 1,200 mm in total length (in Nebraska).

The prairie cornsnake is known only from extreme southern Nebraska (Gage County west to probably Harlan County) (Fig. 39).

40. *Elaphe obsoleta* (Pilot Blacksnake)

Juveniles of this species are blotched (29–32 body blotches, 5–15 blotches across the tail). The other species of *Elaphe* have more spots on the body as do *Lampropeltis calligaster* and *Pituophis catenifer,* the other species superficially resembling juvenile *Elaphe obsoleta.* As *E. obsoleta* matures, the snakes develop more and more black pigment until the blotched pattern is all but obliterated (traces of the paler areas remain as an indistinct chain of pale flecks and some reddish scales). Adults appear to be uniformly glossy black above except for the white lips and chin. The pilot blacksnake may be the largest snake found in Nebraska. The largest museum specimen I have seen is a male 1,438 mm in body length (were the tail to be complete, the snake would be about 1,700 mm in total length). I have seen specimens dead on the road in excess of 2 m in length. Most adults encountered are in the range of 1,000 to 1,500 mm in total length.

Pilot blacksnakes occur in the deciduous forests in eastern Nebraska and across southeastern Nebraska into Thayer County (Fig. 40).

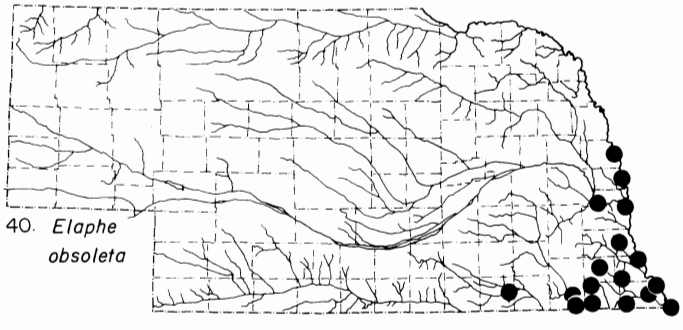

FIGURE 40. Locality records for *Elaphe obsoleta* in Nebraska.

41. *Elaphe vulpina* (Fox Snake)

The fox snake is another spotted snake (34–49 spots or blotches along the center of the back and 10–18 spots or bands along the tail), superficially similar to *E. guttata* and *Lampropeltis calligaster.* As in other *Elaphe,* the body is not round in cross section but rather is angled along the edges of the venter (round in *Lampropeltis*). (*Lampropeltis calligaster* normally has more spots and is olive rather than yellow-brown as in *E. vulpina.*) The belly is yellow with numerous brown or black blotches. Newly hatched snakes are 250 to 300 mm in total length. Adults are 600 to 1,300 mm in total length with females being slightly larger than males.

The fox snake is common in northeastern Nebraska, but also occurs in southeastern Nebraska (absent from the vicinity of Lincoln and places south and east of Lincoln) (Fig. 41).

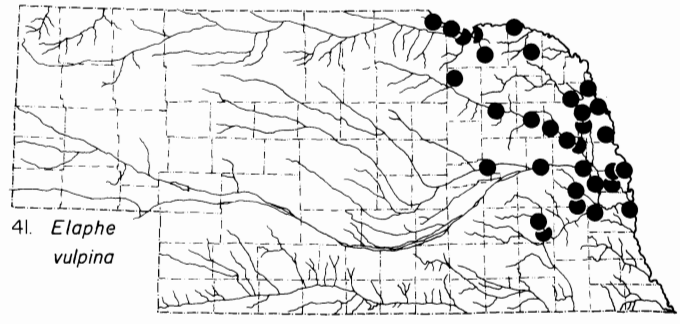

FIGURE 41. Locality records for *Elaphe vulpina* in Nebraska.

42. *Heterodon nasicus* (Western Hognose Snake)

The western hognose is a blotched or spotted snake with a color pattern very much like that of *Crotalus viridis.* Males have 29–42 body blotches and 10–16 tail blotches, whereas females have 34–52 body blotches and 9–15 tail blotches. The up-turned snout and black belly and underside of the tail readily distinguish this species from any other. Despite their fearsome behavior, hognose snakes are perfectly harmless. Males are 390 to 600 mm in total length and females are 440 to 600 mm in total length.

Western hognose snakes occur over the western three-fourths of Nebraska (Fig. 42), but are most common in those areas having sandy soils.

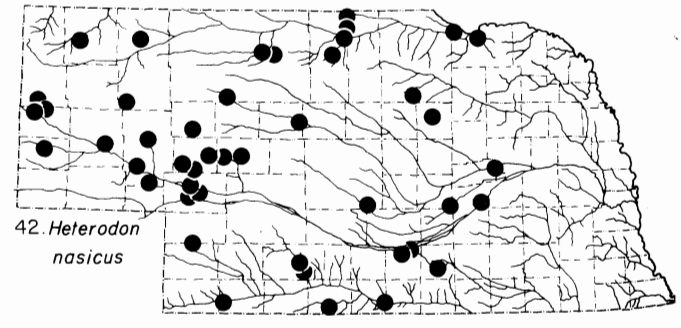

FIGURE 42. Locality records for *Heterodon nasicus* in Nebraska.

43. *Heterodon platyrhinos* (Eastern Hognose Snake)

The eastern hognose is a larger snake than the western hognose, but both species can be found in a few Nebraska counties. The eastern hognose is almost always found in deciduous forest areas or along the sandy streams and rivers bordered by cottonwood forests (areas in which its sole food, toads, abounds). Eastern hognoses have pale undersurfaces of the tail (unlike western hognose) and have fewer, larger body blotches and pale lips. The eastern hognose has 20-30 body blotches and 7-12 tail blotches. Very rarely, the eastern hognose is melanistic (color pattern obliterated by black). In those cases, the pale lips and head shape allow easy identification. Only one of 24 Nebraska specimens in the State Museum is of the black color phase. The largest male I have seen is 832 mm total length; adult females in the museum collection are 649 to 985 mm in total length. When disturbed, these snakes flatten their heads and inflate their bodies providing themselves with a roughly triangular-shaped head.

Eastern hognose snakes occur in eastern Nebraska and along the Niobrara to central Nebraska, the Republican River to southwestern Nebraska, and the lower Platte-Elkhorn rivers (Fig. 43). I expect the species to be found in the Loup River system, but have not seen any examples.

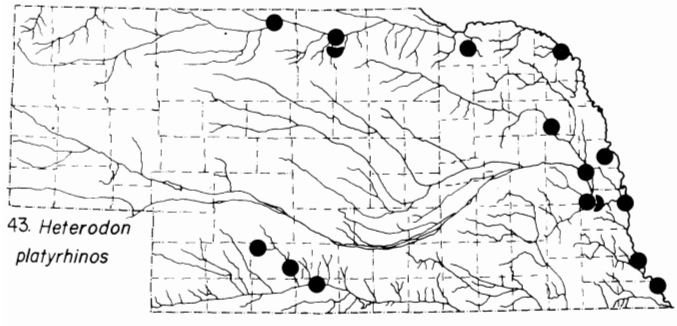

FIGURE 43. Locality records for *Heterodon platyrhinos* in Nebraska.

44. *Lampropeltis calligaster* (Prairie Kingsnake)

The prairie kingsnake is olive with brown spots (45-57 spots down center of body, 11-22 on tail); the venter is heavily blotched with brown. The snakes are round in cross section, unlike the superficially similar *Elaphe guttata* and *E. vulpina*. Snakes of the genus *Lampropeltis* always have perfectly smooth scales and undivided anal plates (unlike *Elaphe*). Prairie kingsnakes are 289 to 302 mm in total length at hatching. Adults exceed 750 mm (the largest Nebraska specimen is a male 1,186 mm in total length).

Prairie kingsnakes occur south and east of the distribution of *E. vulpina* in Nebraska. The snake is known, in Nebraska, only from the southeastern corner (Omaha and Lincoln, south) (Fig. 44).

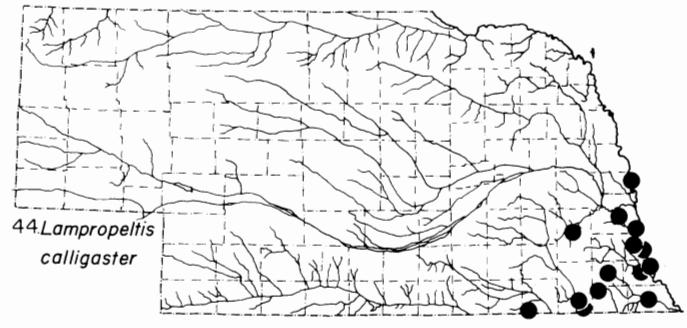

FIGURE 44. Locality records for *Lampropeltis calligaster* in Nebraska.

45. *Lampropeltis getulus* (Common Kingsnake)

The populations of *Lampropeltis getulus* found in Nebraska are of the snakes commonly known as salt and pepper kingsnakes because they are black with a yellow spot in the centers of most scales. Nonetheless, in many specimens a pattern can be detected such that the intensity of yellow spots in scales forms a chain defining a series of body blotches. No other snake in the Great Plains can be confused with this species. Nebraska specimens are relatively small (males to 1,124 mm total length, females to 1,108 mm).

I have seen specimens from Lancaster, Gage, and Pawnee counties and suspect the snake occurs in only a limited area in southeastern or possibly southern (just along the frontier with Kansas) Nebraska (Fig. 45). Hudson (1942) reported a specimen from Boyd County, Nebraska, but that record is here rejected. According to notes in the State Museum, the Boyd County record was of a snake killed on the road and it was not

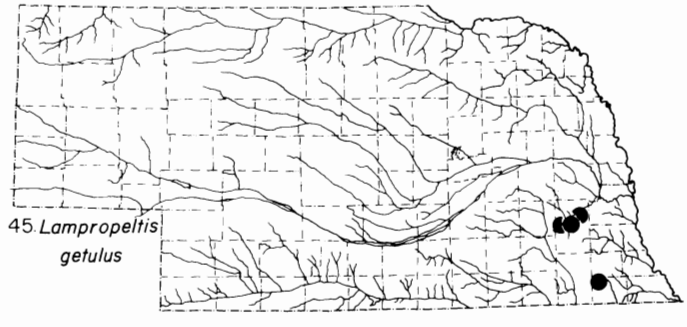

FIGURE 45. Locality records for *Lampropeltis getulus* in Nebraska.

preserved. This record is much farther north than any other for the Plains and why it was not preserved is difficult to understand. In the absence of a preserved example, it is suspected that the specimen was a misidentification, but of what I simply don't know. Until additional specimens are secured in northeastern Nebraska or adjacent South Dakota, the record should be ignored.

46. *Lampropeltis triangulum* (Milk Snake)

This species is very widely distributed and exhibits considerable geographic variation in pattern and in coloration. Accordingly, the species has been subdivided into many geographic races, three of which are reputed to occur in Nebraska. The venter is white checkered with black, banded (most red, but some black), or immaculate in the three subspecies of *Lampropeltis triangulum* recorded from Nebraska by Williams (1978). The snakes found in extreme eastern Nebraska are the least banded (that is, the body blotches do not reach the edges of the ventrals in all cases and there are traces of lateral spots). In the other two races, no lateral spot is evident and the body blotches reach the ventrals or extend onto the ventrals. The snakes have red spots or bands edged with black; the interspaces are cream to gray. The body bears 19–29 bands, there are 4–10 bands on the tail (Nebraska specimens only). Males reach lengths of 767 mm and females reach 681 mm total lengths (most specimens available are juvenile or young snakes).

Milk snakes occur throughout Nebraska (Fig. 46).

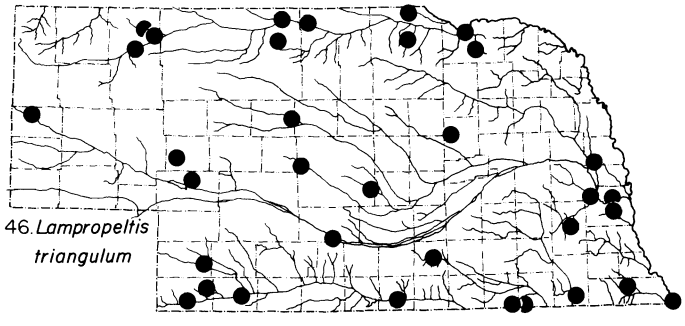

FIGURE 46. Locality records for *Lampropeltis triangulum* in Nebraska.

47. *Masticophis flagellum* (Coachwhip Snake)

Coachwhip snakes have little or no color pattern aside from irregular and interconnected darker crossbands. Adults and subadult snakes are slightly darker anteriorly than posteriorly and lack any pattern. The throat is streaked with brown, but the venter is otherwise creamy white. The snakes are tan to slightly reddish brown above. Coachwhips are large snakes, although the largest Nebraska specimen is not large compared to specimens elsewhere in the species' range. Males are 1,020 to 1,355 mm in snout-vent length (1,370 to 1,770 total lengths); females are 930 to 1,012 mm in snout-vent length (1,250 to 1,330 mm total lengths), based on small samples.

This is a relatively common snake in southwestern Nebraska to judge from the number encountered dead on the roads. The species is known from Chase, Dundy, Hitchcock, and Lincoln counties (Fig. 47).

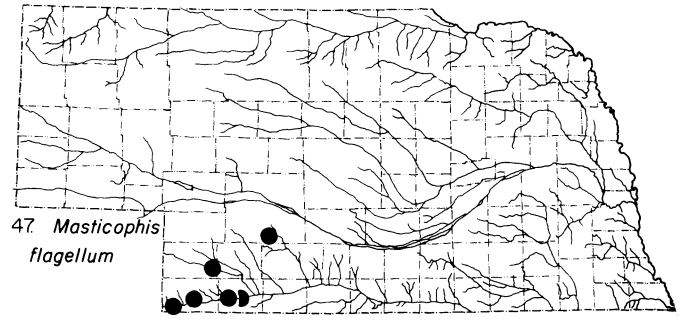

FIGURE 47. Locality records for *Masticophis flagellum* in Nebraska.

48. *Nerodia sipedon* (Common or Northern Watersnake)

The common watersnake has cross bands on the anterior portion of the body, but the lateral spots alternate with the dorsal blotches over most of the length of the body. There are 28–42 body bands/blotches and 18–30 tail bands. The number of bands varies from 2-22 (mean 8)—before the lateral blotches begin to alternate with the dorsal blotches. The ground color varies from pale gray to reddish brown; the blotches are darker reddish brown. The venter is spotted with black and reddish brown. Old individuals are sometimes quite dark, with little

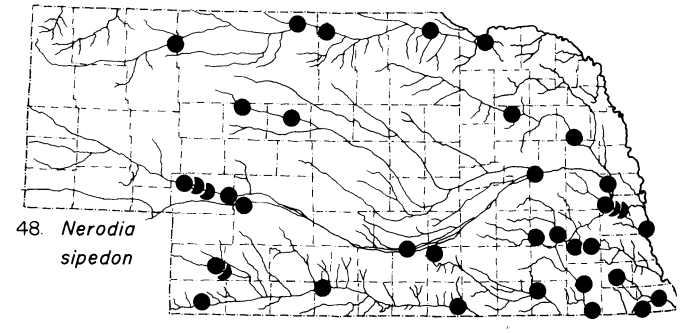

FIGURE 48. Locality records for *Nerodia sipedon* in Nebraska.

indication of bands or blotches. Males are markedly smaller than females. Newborn snakes, of either sex, are 191 to 213 mm in total length. Adult males are 521 to 769 mm in total length, whereas adult females are 811 to 1,063 mm in total length.

The common watersnake occurs in marshes and along streams and rivers over Nebraska with the exception of the Panhandle (Fig. 48). Few records are available for central Nebraska, including the Sand Hills.

49. *Opheodrys vernalis* (Smooth Green Snake)

The smooth green snake is a small (largest known specimen from Nebraska 519 mm total length), green snake having smooth scales. The only other snake having this color and absence of a pattern is the larger green racer. Racers at the size of adult green snakes are blotched (*see* account for *Coluber constrictor*). Racers have 17 rows of scales on the neck and body whereas green snakes have only 15.

The green snake is one of the rarest snakes found in Nebraska but is known from widely scattered localities in the eastern two-thirds of the state (Fig. 49). These records represent all records accumulated over the past 90 yr—fewer than 20 specimens have been seen by herpetologists. In states to the east, *O. vernalis* is a common snake in wet meadows; its rarity in Nebraska is consistent with the hypothesis that the species is living in marginal environments in Nebraska and tottering at the edge of extinction here.

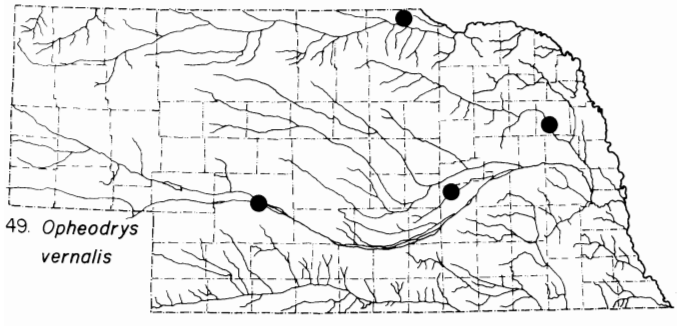

FIGURE 49. Locality records for *Opheodrys vernalis* in Nebraska.

50. *Pituophis catenifer* (Bull Snake)

Bull snakes are statewide in distribution and seemingly resistant to the pressures of agriculture and urban expansion (Fig. 50). These snakes persist in vacant lots and parks in the state's largest urban areas and are the most frequently encountered snakes on Nebraska's roadways (albeit, dead). These snakes are blotched, having 43–64 brown, reddish brown, or black blotches on the back (neck and body) and an additional 9–15 bands on the tail. The ground color varies from pale creamy brown to dark brown. The face is boldly marked with dark brown bars and stripes. The ventral surfaces are cream with brown or black blotches. These snakes have a somewhat pointed head (and four rather than two prefrontal scales) and keeled scales. At hatching, bull snakes are as small as 340 mm in total length. Adult females in the State Museum are as small as 948 mm in total length. Adult males reach lengths of at least 1,785 mm and adult females of at least 1,433 mm total length. I have frequently had reports of yet larger individuals, but have not encountered them among the hundreds of bull snakes found in Nebraska in the past 15 yr. I suspect that Nebraska specimens exceed 2,000 mm in total length. Specimens from eastern Nebraska are darker than those from western Nebraska and have less space between the spots on the neck. Bull snakes vibrate the tail when disturbed producing a sound rather like a rattlesnake's rattle. They are capable of an even more convincing sound when they release air from the lungs. This rattlelike noise is especially convincing when a snake is found in tall grass in an area where rattlesnakes are known to occur.

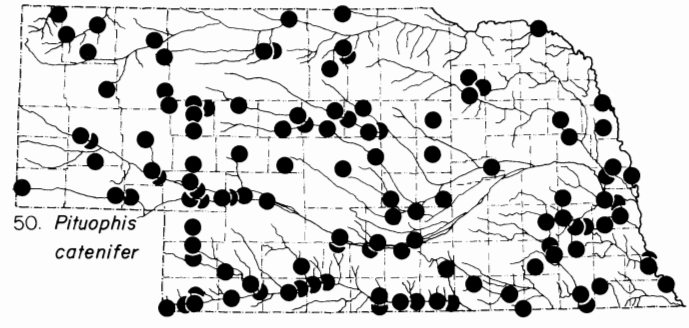

FIGURE 50. Locality records for *Pituophis catenifer* in Nebraska.

The use of the name *Pituophis catenifer* for bull snakes requires some explanation. Most workers use *Pituophis melanoleucas* as the correct name, reflecting agreement with the case advanced by Smith and Kennedy (1951), Fugler (1955), and Conant (1956) that pine snakes and bull snakes share a gene pool as evidenced by the occurrence of intermediate specimens in eastern Texas. The problem with such an argument is that it is based on precious few specimens, and while consistent with the wave of the "New Systematics" of the forties and fifties requires more evidence than now exists. These authors were not sufficiently critical in distinguishing intergradation (in which case the conclusion is accepted) from hybridization (in which case, bull snakes and pine snakes are different species). In light of the osteological difference between bull snakes and pine snakes and the tenuous case upon which the subspecies argument is based, the most accurate position to

take at the present is that the pine snakes of the American southeast constitute a species distinct from the bull and gopher snakes of the prairies and western North America.

51. *Regina grahami* (Graham's Watersnake)

Graham's watersnake is an inoffensive snake found along partially shaded streams and lakes in eastern Nebraska (Fig. 51). The snake may be locally abundant but is secretive and easily overlooked. These snakes are striped although the striping is subtle. The snake may appear to be uniformly chocolate brown above except for the cream stripes low on the body. There are darker stripes in the brown dorsal color. There is a row of dark spots down the center of an otherwise cream venter. These snakes have small heads, especially pronounced when viewing a gravid female. Adults are medium sized (males 495 to 721 mm in total length, females 623 to 795 mm in total length). As in the case of all striped snakes found in Nebraska, young are born alive.

Graham's watersnakes are known only from southeastern Nebraska, but may have a slightly more extensive range than that suggested by the known records.

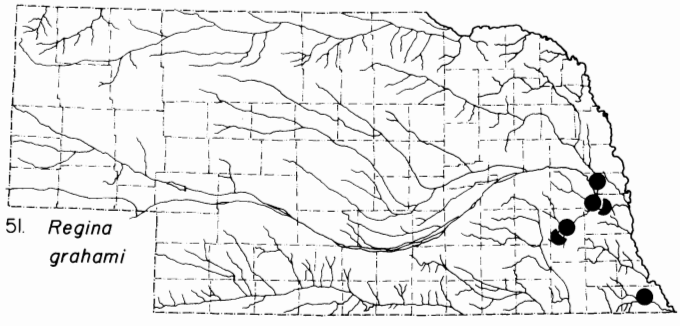

FIGURE 51. Locality records for *Regina grahami* in Nebraska.

52. *Sistrurus catenatus* (Massasauga Rattlesnake)

The massasauga is a spotted snake having 33–43 body blotches and in males 7 or 8 tail blotches (5–7 tail blotches in females). The head is covered on top by large scales (as in harmless snakes) unlike the condition seen in other rattlesnakes (only small scales between the eyes). The venter is cream with brown mottling. The face is marked by light and dark stripes (similar to *Crotalus viridis* but unlike *C. horridus*). At birth, these are very small snakes (180 to 230 mm in total length). Adults reach lengths of at least 770 mm (males) and 780 mm (females) in Nebraska.

The massasauga has fared poorly against human modifications of the environment. These snakes were probably once widely distributed in the eastern third of Nebraska, inhabiting the tall-grass prairies and marshes there. The alteration of agricultural practices during this century has altered the environment so that grasslands remain on scattered small reserves and in the memory of older citizens. A casualty was this small rattlesnake. The snake persists in several areas, most in private hands but two under state protection (Pawnee County) (Fig. 52). Preserved examples of this snake document its distribution in southeastern Nebraska. However, the map provides a false impression because it includes localities at which these snakes used to occur as well as the few at which it is now known to occur.

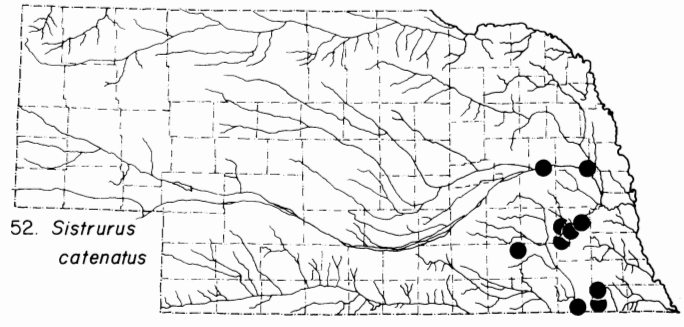

FIGURE 52. Locality records for *Sistrurus catenatus* in Nebraska.

53. *Storeria dekayi* (Brown Snake)

The brown snake is pale brown with slightly darker small spots and a broad, slightly lighter pale stripe down the center of the back. The ventral surfaces are pale cream to slightly pinkish. The side of the head is pale with a dark vertical bar behind the eyes. These are small snakes (less than 100 mm total length at birth) and reaching only 315 mm (males) and 330 mm (females) in total lengths. The body spots are such that they form a row on each side of the midline stripe (all "spotted" snakes have blotches of spots that lie on the midline). In some individuals there are faint lines crossing the dorsal stripe to join the lateral spots.

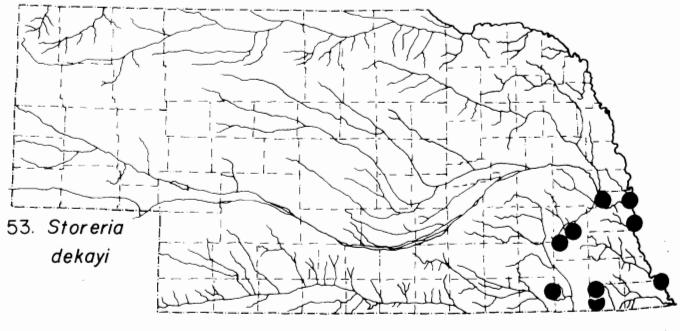

FIGURE 53. Locality records for *Storeria dekayi* in Nebraska.

The brown snake is known only from southeastern Nebraska where it occurs most often in mesic wooded areas (Fig. 53).

54. *Storeria occipitomaculata* (Red-bellied Snake)

Only two specimens of this species are known (one from a vague locality on the Missouri River and the other from Buffalo County) (Fig. 54). The first specimen was obtained early in the 19th century, whereas the second was found in the 1960s. The western record (based on Kearney State College Museum 161) is a large adult female (328 mm total length) from 1.6 km south of Odessa. This specimen is dark brown above with faint indications of a grayish dorsal stripe (in most specimens, the dorsal stripe is most easily seen by virtue of the thin dark stripes lateral to it). The lateral third of each ventral scale is black and the central third cream (probably salmon in life). This species normally has pale spots on the posterior end of the head and adjacent neck (not evident in KSCM 161).

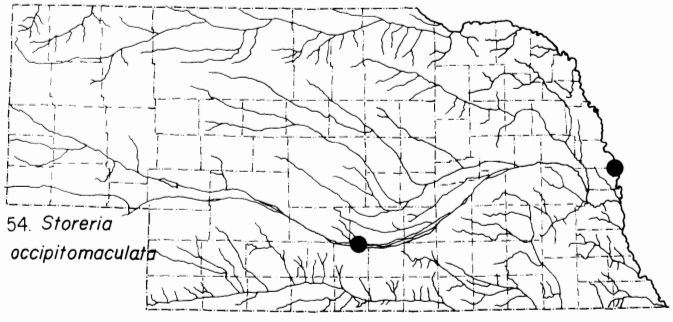

FIGURE 54. Locality records for *Storeria occipitomaculata* in Nebraska.

The record for Buffalo County is a considerably western one and raises the possibility that the records for western Kansas, cited as doubtful by Smith (1956) and rejected by Collins (1974 and 1982), may be valid. At any rate, this is by far the rarest snake known from Nebraska.

55. *Tantilla nigriceps* (Black-headed Snake)

The black-headed snake is, as its name suggests, a snake with a black head. The body is yellowish brown or gray brown and the ventral surfaces are white. These are slender and small snakes (180 to 277 mm in total length) known, in Nebraska, only from southwestern Nebraska where they pass their secretive lives (Fig. 55). Most specimens found have been found on the road at night during the summer months or during the winter when digging. Specimens have been found as much as 2.4 m under ground. The status of this species in Nebraska is questionable as most records are of snakes taken before the prairies were converted into wheat fields and row-crop fields. These modifications may have been excessive for this small snake (the only recent record is from Chase County in relatively undisturbed prairie).

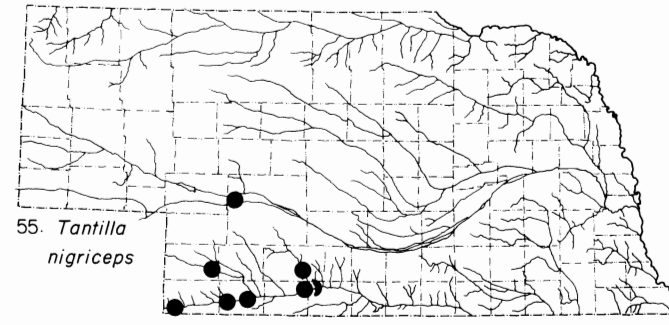

FIGURE 55. Locality records for *Tantilla nigriceps* in Nebraska.

56. *Thamnophis elegans* (Wandering Gartersnake)

The wandering gartersnake barely enters Nebraska (Fig. 56) but should be looked for in all counties bordering Wyoming. Unlike our other gartersnakes, this species has dull and sometimes difficult to see stripes. The dorsal stripe is straw-yellow and has jagged edges, at least anteriorly. The lateral stripes are borne on the second and third scale rows up from the belly (as in *T. sirtalis*). Between the stripes are two rows of spots. The belly is suffused with dark gray or black pigment. There are 21 rows of scales around the neck and body. Based on my limited samples, males are 470 to 530 mm in total length and females are 658 to 775 mm in total length. Baxter and Stone (1980) reported that Wyoming specimens averaged 606 mm (no difference between sexes).

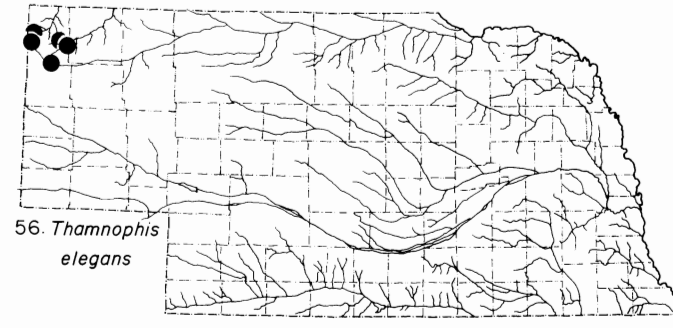

FIGURE 56. Locality records for *Thamnophis elegans* in Nebraska.

57. *Thamnophis proximus* (Western Ribbon Snake)

This gartersnake, found only in eastern Nebraska (Fig. 57), is easily distinguished from other species by virtue of having unmarked lips. The dorsal stripe is orange-red and the lateral stripes are borne on the third and fourth rows of scales

up from the belly. It is most likely to be confused with the more common plains gartersnake (*T. radix*), a heavier bodied snake having bold black bars on the lips and prominent rows of black spots between the stripes on the body. Ribbon snakes are small (adult females to 710 mm total length, males slightly smaller).

Ribbon snakes are known only from the eastern border of Nebraska and in southeastern Nebraska but have probably been overlooked. I suspect that they are much more common than might be surmised by the few specimens now available (fewer than 10).

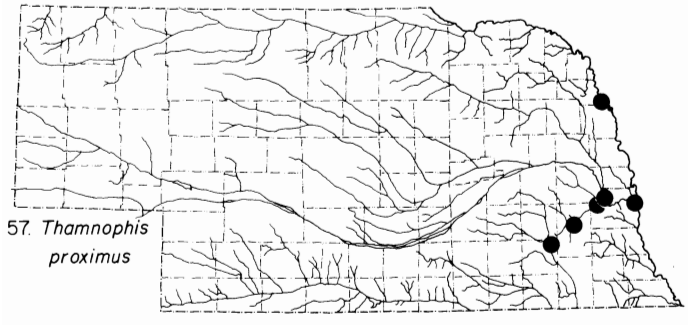

FIGURE 57. Locality records for *Thamnophis proximus* in Nebraska.

58. *Thamnophis radix* (Plains Gartersnake)

The plains gartersnake is the most common snake in Nebraska. It is one of the few snakes that remains common even in densely populated areas and is the snake normally seen in parks and yards in Lincoln and Omaha. Although uncommon in certain microhabitats (along rivers) where the common gartersnake (see below) is abundant, this is the only striped snake found in most localities in Nebraska. At birth, the snakes may be only 150 mm in total length. Adult males are 384 to 895 mm in total length although mostly commonly between 460 and 670 mm. Adult females are 454 to 1,049 mm in total length, but are usually between 540 and 770 mm. The largest specimens come from the western edge of the Sand Hills (Garden and Grant counties) where the minimum size at maturity also may be greater than it is in eastern Nebraska.

Plains gartersnakes have orange dorsal stripes and yellowish lateral stripes. The lateral stripes are borne on the third and fourth scale rows up from the belly, and the space between the stripes bears two rows of black spots on each side of the body. The lips are cream and heavily barred with black. The belly is generally cream in color with no markings. The variation in scale row formulae among populations of this snake in Nebraska is extensive and currently under study. These snakes normally have either 19 or 21 rows of scales on the neck and body, but variation is asymmetrical both by sex and by geography.

Plains gartersnakes are statewide in distribution (Fig. 58).

59. *Thamnophis sirtalis* (Common or Red-sided Gartersnake)

The common gartersnake has a yellow dorsal stripe (edges straight) and yellow lateral stripes. In many individuals, these stripes are best termed olive-yellow. The lateral stripes are borne on the second and third rows of scales up from the belly. Black spots occur in the spaces between the stripes, and the spaces between the spots are brick-red, especially toward the head. The wandering gartersnake has no trace of red in these areas. The common gartersnake has only 19 rows of scales around the neck and body, and the belly is unmarked (no dark pigment). Adult males are 415 to 910 mm in total length. Adult females are 586 to 1,140 mm in total length. Adult females average 630 mm in snout-vent length. Newborns are as small as 197 mm in total length.

The common gartersnake is nearly statewide in distribution, but is apparently absent from the southwestern portion of the Panhandle (Fitch, 1980) (Fig. 59). Beyond this statement, the snake is also absent from most of the Sand Hills lakes and marshes except in those cases where a river penetrates near the lake or marsh. This distribution is most

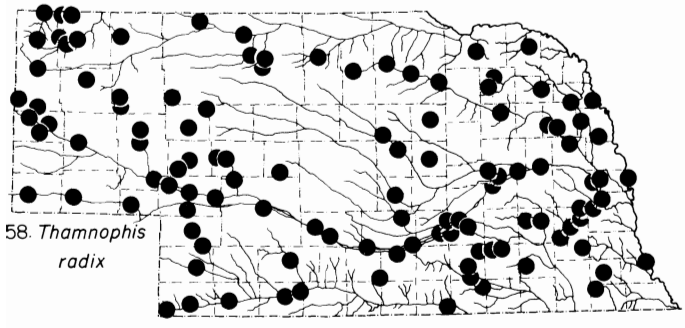

FIGURE 58. Locality records for *Thamnophis radix* in Nebraska.

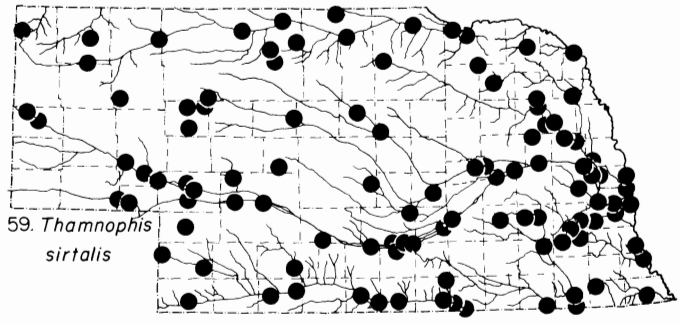

FIGURE 59. Locality records for *Thamnophis sirtalis* in Nebraska.

appreciated by carefully comparing the dot map for this species with that of *T. radix* (which is common in Sand Hills marshes and lakes).

60. *Tropidoclonion lineatum* (Lined Snake)

This is another striped snake, one looking like a small gartersnake with a disproportionately small head. It is most easily distinguished by virtue of having a double row of black half-moons down the length of the venter. The pale lateral stripes occur on the second and third scale rows, and the dorsal stripe is cream. Unlike the gartersnake, there are not prominent black spots between the stripes. Newborns are 95 to 105 mm in total lengths. Adults reach 353 mm in total length.

Although this snake is not uncommon in yards in Lincoln, relatively few records are available. The distribution is best described as through central Nebraska from the eastern border to west-central Nebraska (Fig. 60).

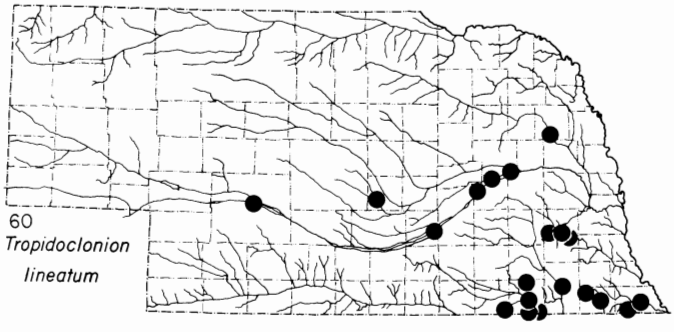

FIGURE 60. Locality records for *Tropidoclonion lineatum* in Nebraska.

SPECIES EXPECTED BUT NOT KNOWN

Hudson's (1942) study of the Nebraska herpetofauna was done by searching the state's perimeter and then extrapolating in order to estimate the distributions of species within the state. The richer fauna of amphibians and reptiles in Kansas (*see* Collins, 1982) has lured most students to counties along Nebraska's southern border in quest of species known from Kansas but not Nebraska. Fewer attractions occur to the east, north, or west although some obviously do. Much of our herpetofauna is peripheral, without substantial Nebraska populations. Despite the efforts of many in searching border counties, additional species likely may yet be added to the state's herpetofauna. These include two snakes (*Nerodia erythrogaster,* the blotched watersnake, and *Nerodia rhombifera,* the diamondback watersnake). Both probably occur in marshes and along streams in Richardson County, Nebraska. In similar habitats, *Chrysemys scripta* (the red ear turtle) may be found, but any record must be viewed with some suspicion because these are popular pets. I reject Hudson's (1942) record of the species from Adams County, Nebraska. Collecting in the Missouri River in Richardson County may reveal the presence of *Graptemys geographica* (map turtle) there. Each of these four species is known from adjacent counties in Kansas or Missouri, but each case is a range limit. *Phrynosoma cornutum* (Texas horned toad) may occur in extreme southern Red Willow and Furnas counties of Nebraska. This is a very distinctive and peculiar lizard (with sharp-pointed spines on the back of the head), and the failure of people to collect specimens may mean that the northern terminus of the species' range is in northern Kansas. However, the southern portions of these counties, away from the Republican River, have not been seriously collected by biologists.

MAP ACCURACY

Persons interested in the distributions of organisms will view two things on the distribution maps provided here. They will see the locality records (represented as solid dots) and they will see the absences of dots. Aside from those species that are distributed statewide, all species have a distributional limit in Nebraska. In some cases, e.g., the leopard frogs, there has been extensive fieldwork aimed at documenting distributional limits and correlations of distributions with environmental features, but for most species no such effort has been expended. In order to provide users with some metric as to how significant might be the absence of collections from a given county, I computed a collection reliability index. Ten species were selected about whose distributions I was confident. Each of the 10 is common, unlikely to be over-looked by the casual collector. These are *Ambystoma tigrinum, Acris crepitans, Bufo woodhousii, Rana blairi, R. pipiens, Terrapene ornata, Coluber constrictor, Pituophis catenifer, Thamnophis radix,* and *T. sirtalis.* The number of species expected for each county varies from 7 (Dawes) to 10 (several counties where the two leopard frogs overlap in distributions). The number of species actually known varies from 2 (22%) to 10. In 17 counties, all species expected are known. The most poorly collected areas of the state are the northeast and through central Nebraska (Fig. 61).

ACKNOWLEDGMENTS

Many people have helped in my quest to secure detailed distributional data for the amphibians and reptiles of Nebraska, but a group of past students deserves special thanks. William Beachly, James Billings, Daniel Brooks, Dale Droge, Jerome Faier, Dudley Friskopp, Charles Hoger, Thomas Hupf, John Korky, Kipp Kruse, Joseph McAuliffe, and Eric Routman always responded to requests to pick up important

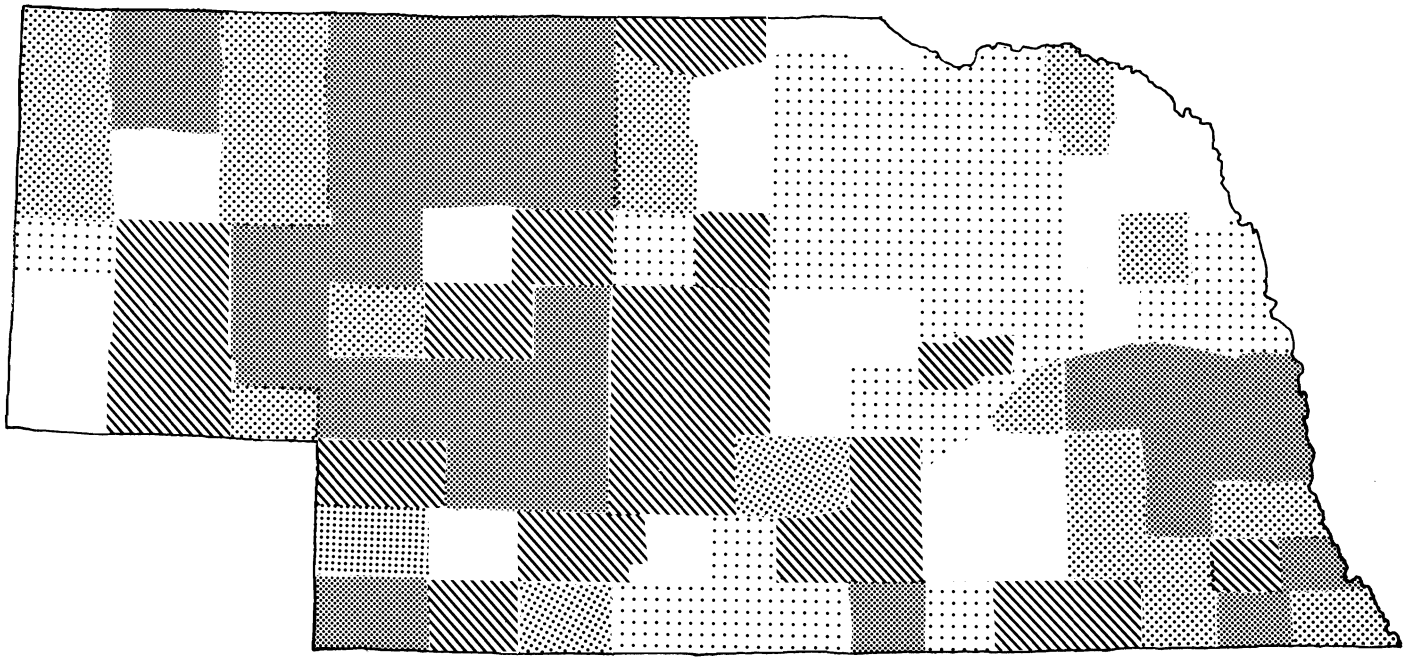

FIGURE 61. Map showing reliability index for distribution maps. Areas lacking markings are counties having map reliabilities between 22% and 50% (four or more species not collected). Those areas lightly stippled have reliabilities of 56% to 70% (three species not collected). Hatched areas have reliabilities of 75% to 80% (two species not collected). Densely stippled areas are those for which only one species has not been collected (reliabilities of 88% to 90%). All expected species are known from the solid counties.

specimens, and each shared the joys of fieldwork in the prairies and woodlands of Nebraska. My work in western Nebraska was facilitated by the directors of Cedar Point Biological Station (John Janovy and Brent Nickol) between 1975 and 1983. Collecting permits were provided by the Nebraska Game and Parks Commission, and numerous courtesies were extended by officials of the Commission. Some of the materials forming the basis of this report were collected with support provided by the University of Nebraska Research Council.

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